


**OM-486** 187 236H

February 2000

## Processes

MIG (GMAW) Welding

Flux Cored (FCAW)


Stick (SMAW) Welding


TIG (GTAW) Welding

## Description

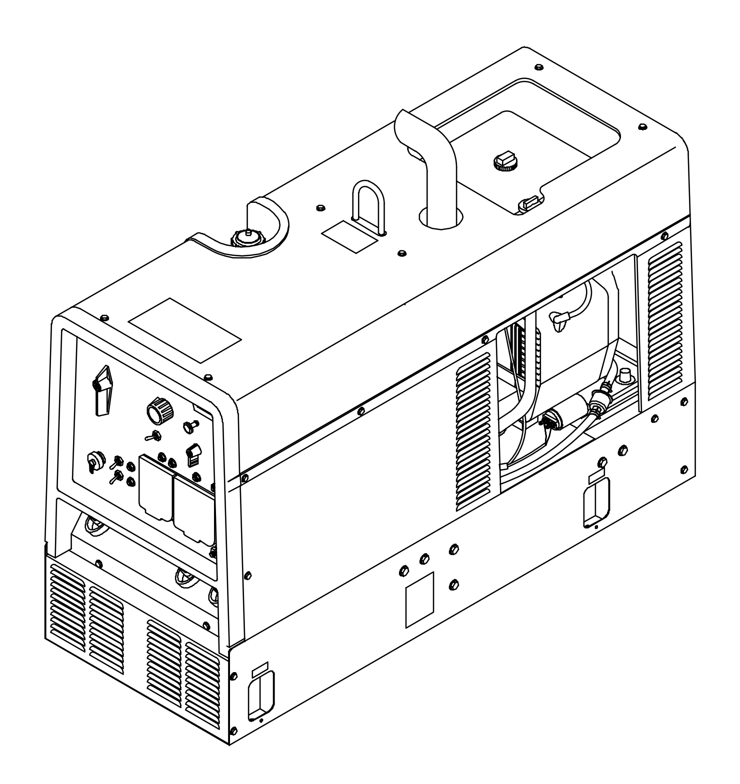




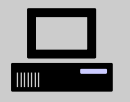


Engine Driven Welding Generator

# Trailblazer® 251 NT



# OWNER'S MANUAL



Visit our website at

**www.MillerWelds.com**

# From Miller to You

*Thank you* and *congratulations* on choosing Miller. Now you can get the job done and get it done right. We know you don't have time to do it any other way.



That's why when Niels Miller first started building arc welders in 1929, he made sure his products offered long-lasting value and superior quality. Like you, his customers couldn't afford anything less. Miller products had to be more than the best they could be. They had to be the best you could buy.

Today, the people that build and sell Miller products continue the tradition. They're just as committed to providing equipment and service that meets the high standards of quality and value established in 1929.

This Owner's Manual is designed to help you get the most out of your Miller products. Please take time to read the Safety precautions. They will help you protect yourself against potential hazards on the worksite. We've made installation and operation quick and easy. With Miller you can count on years of reliable service with proper maintenance. And if for some reason the unit needs repair, there's a Troubleshooting section that will help you figure out what the problem is. The parts list will then help you to decide which exact part you may need to fix the problem. Warranty and service information for your particular model are also provided.




Miller is the first welding equipment manufacturer in the U.S.A. to be registered to the ISO 9001 Quality System Standard.




Working as hard as you do – every power source from Miller is backed by the most hassle-free warranty in the business.

*Miller offers a Technical Manual which provides more detailed service and parts information for your unit. To obtain a Technical Manual, contact your local distributor. Your distributor can also supply you with Welding Process Manuals such as SMAW, GTAW, GMAW, and GMAW-P.*




Miller Electric manufactures a full line of welders and welding related equipment. For information on other quality Miller products, contact your local Miller distributor to receive the latest full line catalog or individual catalog sheets. **To locate your nearest distributor or service agency call 1-800-4-A-Miller, or visit us at www.MillerWelds.com on the web.**



**⚠ WARNING**

**This product, when used for welding or cutting, produces fumes or gases which contain chemicals known to the State of California to cause birth defects and, in some cases, cancer. (California Health & Safety Code Section 25249.5 et seq.)**

**⚠ WARNING**

**Battery posts, terminals and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. Wash hands after handling.**

**⚠ WARNING**

**The engine exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.**

The following terms are used interchangeably throughout this manual:
MIG = GMAW, Wire Welding
TIG = GTAW
Stick = SMAW

# TABLE OF CONTENTS

# SECTION 1 – SAFETY PRECAUTIONS - READ BEFORE USING

rom _nd_11/98

## 1-1. Symbol Usage



Means Warning! Watch Out! There are possible hazards with this procedure! The possible hazards are shown in the adjoining symbols.

▲ **Marks a special safety message.**

☞ *Means “Note”; not safety related.*

This group of symbols means Warning! Watch Out! possible ELECTRIC SHOCK, MOVING PARTS, and HOT PARTS hazards. Consult symbols and related instructions below for necessary actions to avoid the hazards.

## 1-2. Arc Welding Hazards

▲ **The symbols shown below are used throughout this manual to call attention to and identify possible hazards. When you see the symbol, watch out, and follow the related instructions to avoid the hazard. The safety information given below is only a summary of the more complete safety information found in the Safety Standards listed in Section 1-5. Read and follow all Safety Standards.**

▲ **Only qualified persons should install, operate, maintain, and repair this unit.**

▲ **During operation, keep everybody, especially children, away.**



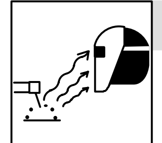
### ELECTRIC SHOCK can kill.

Touching live electrical parts can cause fatal shocks or severe burns. The electrode and work circuit is electrically live whenever the output is on. The input power circuit and machine internal circuits are also live when power is on. In semiautomatic or automatic wire welding, the wire, wire reel, drive roll housing, and all metal parts touching the welding wire are electrically live. Incorrectly installed or improperly grounded equipment is a hazard.

- Do not touch live electrical parts.
- Wear dry, hole-free insulating gloves and body protection.
- Insulate yourself from work and ground using dry insulating mats or covers big enough to prevent any physical contact with the work or ground.
- Do not use AC output in damp areas, if movement is confined, or if there is a danger of falling.
- Use AC output ONLY if required for the welding process.
- If AC output is required, use remote output control if present on unit.
- Disconnect input power or stop engine before installing or servicing this equipment. Lockout/tagout input power according to OSHA 29 CFR 1910.147 (see Safety Standards).
- Properly install and ground this equipment according to its Owner’s Manual and national, state, and local codes.
- Always verify the supply ground – check and be sure that input power cord ground wire is properly connected to ground terminal in disconnect box or that cord plug is connected to a properly grounded receptacle outlet.
- When making input connections, attach proper grounding conductor first – double-check connections.
- Frequently inspect input power cord for damage or bare wiring – replace cord immediately if damaged – bare wiring can kill.
- Turn off all equipment when not in use.
- Do not use worn, damaged, undersized, or poorly spliced cables.
- Do not drape cables over your body.
- If earth grounding of the workpiece is required, ground it directly with a separate cable.
- Do not touch electrode if you are in contact with the work, ground, or another electrode from a different machine.
- Use only well-maintained equipment. Repair or replace damaged parts at once. Maintain unit according to manual.
- Wear a safety harness if working above floor level.
- Keep all panels and covers securely in place.
- Clamp work cable with good metal-to-metal contact to workpiece or worktable as near the weld as practical.
- Insulate work clamp when not connected to workpiece to prevent contact with any metal object.
- Do not connect more than one electrode or work cable to any single weld output terminal.

**SIGNIFICANT DC VOLTAGE exists after stopping engine on inverters.**

- Stop engine on inverter and discharge input capacitors according to instructions in Maintenance Section before touching any parts.



### ARC RAYS can burn eyes and skin.

Arc rays from the welding process produce intense visible and invisible (ultraviolet and infrared) rays that can burn eyes and skin. Sparks fly off from the weld.

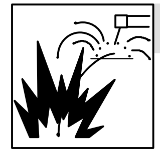
- Wear a welding helmet fitted with a proper shade of filter to protect your face and eyes from arc rays and sparks when welding or watching (see ANSI Z49.1 and Z87.1 listed in Safety Standards).
- Wear approved safety glasses with side shields under your helmet.
- Use protective screens or barriers to protect others from flash and glare; warn others not to watch the arc.
- Wear protective clothing made from durable, flame-resistant material (wool and leather) and foot protection.



### FUMES AND GASES can be hazardous.

Welding produces fumes and gases. Breathing these fumes and gases can be hazardous to your health.

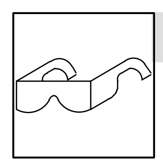
- Keep your head out of the fumes. Do not breathe the fumes.
- If inside, ventilate the area and/or use exhaust at the arc to remove welding fumes and gases.
- If ventilation is poor, use an approved air-supplied respirator.
- Read the Material Safety Data Sheets (MSDSs) and the manufacturer's instructions for metals, consumables, coatings, cleaners, and degreasers.
- Work in a confined space only if it is well ventilated, or while wearing an air-supplied respirator. Always have a trained watchperson nearby. Welding fumes and gases can displace air and lower the oxygen level causing injury or death. Be sure the breathing air is safe.
- Do not weld in locations near degreasing, cleaning, or spraying operations. The heat and rays of the arc can react with vapors to form highly toxic and irritating gases.
- Do not weld on coated metals, such as galvanized, lead, or cadmium plated steel, unless the coating is removed from the weld area, the area is well ventilated, and if necessary, while wearing an air-supplied respirator. The coatings and any metals containing these elements can give off toxic fumes if welded.



### WELDING can cause fire or explosion.

Welding on closed containers, such as tanks, drums, or pipes, can cause them to blow up. Sparks can fly off from the welding arc. The flying sparks, hot workpiece, and hot equipment can cause fires and burns. Accidental contact of electrode to metal objects can cause sparks, explosion, overheating, or fire. Check and be sure the area is safe before doing any welding.

- Protect yourself and others from flying sparks and hot metal.
- Do not weld where flying sparks can strike flammable material.
- Remove all flammables within 35 ft (10.7 m) of the welding arc. If this is not possible, tightly cover them with approved covers.
- Be alert that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas.
- Watch for fire, and keep a fire extinguisher nearby.
- Be aware that welding on a ceiling, floor, bulkhead, or partition can cause fire on the hidden side.
- Do not weld on closed containers such as tanks, drums, or pipes, unless they are properly prepared according to AWS F4.1 (see Safety Standards).
- Connect work cable to the work as close to the welding area as practical to prevent welding current from traveling long, possibly unknown paths and causing electric shock and fire hazards.
- Do not use welder to thaw frozen pipes.
- Remove stick electrode from holder or cut off welding wire at contact tip when not in use.
- Wear oil-free protective garments such as leather gloves, heavy shirt, cuffless trousers, high shoes, and a cap.
- Remove any combustibles, such as a butane lighter or matches, from your person before doing any welding.



### FLYING METAL can injure eyes.

- Welding, chipping, wire brushing, and grinding cause sparks and flying metal. As welds cool, they can throw off slag.
- Wear approved safety glasses with side shields even under your welding helmet.



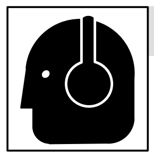
### BUILDUP OF GAS can injure or kill.

- Shut off shielding gas supply when not in use.
- Always ventilate confined spaces or use approved air-supplied respirator.



### HOT PARTS can cause severe burns.

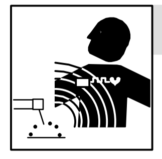
- Allow cooling period before maintaining.
- Wear protective gloves and clothing when working on a hot engine.
- Do not touch hot engine parts or just-welded parts bare-handed.



### NOISE can damage hearing.

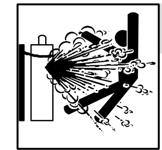
Noise from some processes or equipment can damage hearing.

- Wear approved ear protection if noise level is high.



### MAGNETIC FIELDS can affect pacemakers.

- Pacemaker wearers keep away.
- Wearers should consult their doctor before going near arc welding, gouging, or spot welding operations.

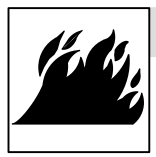


### CYLINDERS can explode if damaged.

Shielding gas cylinders contain gas under high pressure. If damaged, a cylinder can explode. Since gas cylinders are normally part of the welding process, be sure to treat them carefully.

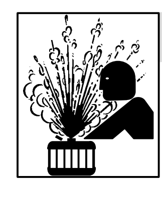
- Protect compressed gas cylinders from excessive heat, mechanical shocks, slag, open flames, sparks, and arcs.
- Install cylinders in an upright position by securing to a stationary support or cylinder rack to prevent falling or tipping.
- Keep cylinders away from any welding or other electrical circuits.
- Never drape a welding torch over a gas cylinder.
- Never allow a welding electrode to touch any cylinder.
- Never weld on a pressurized cylinder – explosion will result.
- Use only correct shielding gas cylinders, regulators, hoses, and fittings designed for the specific application; maintain them and associated parts in good condition.
- Turn face away from valve outlet when opening cylinder valve.
- Keep protective cap in place over valve except when cylinder is in use or connected for use.
- Read and follow instructions on compressed gas cylinders, associated equipment, and CGA publication P-1 listed in Safety Standards.

## 1-3. Engine Hazards



### FUEL can cause fire or explosion.

- Stop engine and let it cool off before checking or adding fuel.
- Do not add fuel while smoking or if unit is near any sparks or open flames.
- Do not overfill tank – allow room for fuel to expand.
- Do not spill fuel. If fuel is spilled, clean up before starting engine.
- Dispose of rags in a fireproof container.



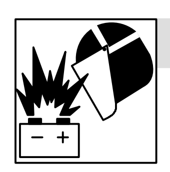
### STEAM AND HOT COOLANT can burn.

- If possible, check coolant level when engine is cold to avoid scalding.
- Always check coolant level at overflow tank, if present on unit, instead of radiator (unless told otherwise in maintenance section or engine manual).
- If the engine is warm, checking is needed, and there is no overflow tank, follow the next two statements.
- Wear safety glasses and gloves and put a rag over radiator cap.
- Turn cap slightly and let pressure escape slowly before completely removing cap.



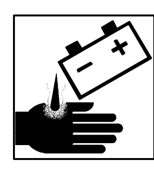
### MOVING PARTS can cause injury.

- Keep away from fans, belts, and rotors.
- Keep all doors, panels, covers, and guards closed and securely in place.
- Stop engine before installing or connecting unit.
- Have only qualified people remove guards or covers for maintenance and troubleshooting as necessary.
- To prevent accidental starting during servicing, disconnect negative (–) battery cable from battery.
- Keep hands, hair, loose clothing, and tools away from moving parts.
- Reinstall panels or guards and close doors when servicing is finished and before starting engine.
- Before working on generator, remove spark plugs or injectors to keep engine from kicking back or starting.
- Block flywheel so that it will not turn while working on generator components.



### BATTERY EXPLOSION can BLIND.

- Always wear a face shield, rubber gloves, and protective clothing when working on a battery.
- Stop engine before disconnecting or connecting battery cables or servicing battery.
- Do not allow tools to cause sparks when working on a battery.
- Do not use welder to charge batteries or jump start vehicles.
- Observe correct polarity (+ and –) on batteries.
- Disconnect negative (–) cable first and connect it last.



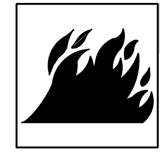
### BATTERY ACID can BURN SKIN and EYES.

- Do not tip battery.
- Replace damaged battery.
- Flush eyes and skin immediately with water.



### ENGINE EXHAUST GASES can kill.

- Use equipment outside in open, well-ventilated areas.
- If used in a closed area, vent engine exhaust outside and away from any building air intakes.



### ENGINE HEAT can cause fire.

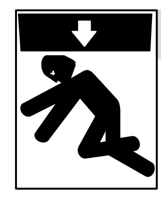
- Do not locate unit on, over, or near combustible surfaces or flammables.
- Keep exhaust and exhaust pipes way from flammables.



### EXHAUST SPARKS can cause fire.

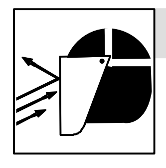
- Do not let engine exhaust sparks cause fire.
- Use approved engine exhaust spark arrestor in required areas – see applicable codes.

## 1-4. Additional Symbols For Installation, Operation, And Maintenance



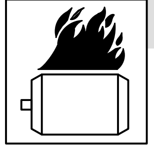
### FALLING UNIT can cause injury.

- Use lifting eye to lift unit only, NOT running gear, gas cylinders, trailer, or any other accessories.
- Use equipment of adequate capacity to lift and support unit.
- If using lift forks to move unit, be sure forks are long enough to extend beyond opposite side of unit.



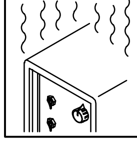
### FLYING SPARKS can cause injury.

- Wear a face shield to protect eyes and face.
- Shape tungsten electrode only on grinder with proper guards in a safe location wearing proper face, hand, and body protection.
- Sparks can cause fires — keep flammables away.



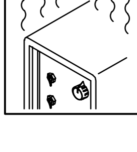
### OVERHEATING can damage motors.

- Turn off or unplug equipment before starting or stopping engine.
- Do not let low voltage and frequency caused by low engine speed damage electric motors.
- Do not connect 50 or 60 Hertz motors to the 100 Hertz receptacle where applicable.



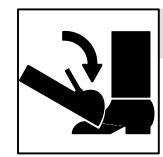
### OVERUSE can cause OVERHEATING.

- Allow cooling period; follow rated duty cycle.
- Reduce current or reduce duty cycle before starting to weld again.
- Do not block or filter airflow to unit.



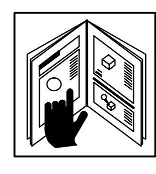
### STATIC (ESD) can damage PC boards.

- Put on grounded wrist strap BEFORE handling boards or parts.
- Use proper static-proof bags and boxes to store, move, or ship PC boards.



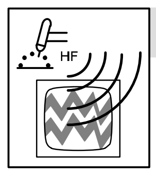
### TILTING OF TRAILER can cause injury.

- Use tongue jack or blocks to support weight.
- Properly install welding generator onto trailer according to instructions supplied with trailer.



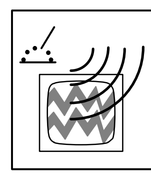
### READ INSTRUCTIONS.

- Use only genuine MILLER replacement parts.
- Perform engine maintenance and service according to this manual and the engine manual.




### H.F. RADIATION can cause interference.

- High-frequency (H.F.) can interfere with radio navigation, safety services, computers, and communications equipment.
- Have only qualified persons familiar with electronic equipment perform this installation.
- The user is responsible for having a qualified electrician promptly correct any interference problem resulting from the installation.
- If notified by the FCC about interference, stop using the equipment at once.
- Have the installation regularly checked and maintained.
- Keep high-frequency source doors and panels tightly shut, keep spark gaps at correct setting, and use grounding and shielding to minimize the possibility of interference.



### ARC WELDING can cause interference.

- Electromagnetic energy can interfere with sensitive electronic equipment such as computers and computer-driven equipment such as robots.
- Be sure all equipment in the welding area is electromagnetically compatible.
- To reduce possible interference, keep weld cables as short as possible, close together, and down low, such as on the floor.
- Locate welding operation 100 meters from any sensitive electronic equipment.
- Be sure this welding machine is installed and grounded according to this manual.
- If interference still occurs, the user must take extra measures such as moving the welding machine, using shielded cables, using line filters, or shielding the work area.

## 1-5. Principal Safety Standards

*Safety in Welding and Cutting*, ANSI Standard Z49.1, from American Welding Society, 550 N.W. LeJeune Rd, Miami FL 33126

*Safety and Health Standards*, OSHA 29 CFR 1910, from Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

*Recommended Safe Practices for the Preparation for Welding and Cutting of Containers That Have Held Hazardous Substances*, American Welding Society Standard AWS F4.1, from American Welding Society, 550 N.W. LeJeune Rd, Miami, FL 33126

*National Electrical Code*, NFPA Standard 70, from National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

*Safe Handling of Compressed Gases in Cylinders*, CGA Pamphlet P-1, from Compressed Gas Association, 1235 Jefferson Davis Highway, Suite 501, Arlington, VA 22202.

*Code for Safety in Welding and Cutting*, CSA Standard W117.2, from Canadian Standards Association, Standards Sales, 178 Rexdale Boulevard, Rexdale, Ontario, Canada M9W 1R3.

*Safe Practices For Occupation And Educational Eye And Face Protection*, ANSI Standard Z87.1, from American National Standards Institute, 1430 Broadway, New York, NY 10018.

*Cutting And Welding Processes*, NFPA Standard 51B, from National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

## 1-6. EMF Information

Considerations About Welding And The Effects Of Low Frequency Electric And Magnetic Fields

Welding current, as it flows through welding cables, will cause electromagnetic fields. There has been and still is some concern about such fields. However, after examining more than 500 studies spanning 17 years of research, a special blue ribbon committee of the National Research Council concluded that: “The body of evidence, in the committee’s judgment, has not demonstrated that exposure to power-frequency electric and magnetic fields is a human-health hazard.” However, studies are still going forth and evidence continues to be examined. Until the final conclusions of the research are reached, you may wish to minimize your exposure to electromagnetic fields when welding or cutting.

To reduce magnetic fields in the workplace, use the following procedures:

1. Keep cables close together by twisting or taping them.
2. Arrange cables to one side and away from the operator.
3. Do not coil or drape cables around your body.
4. Keep welding power source and cables as far away from operator as practical.
5. Connect work clamp to workpiece as close to the weld as possible.

**About Pacemakers:**

Pacemaker wearers consult your doctor first. If cleared by your doctor, then following the above procedures is recommended.

# SECTION 1 – CONSIGNES DE SÉCURITÉ – LIRE AVANT UTILISATION

rom _nd_fre 11/98

## 1-1. Signification des symboles



Signifie Mise en garde ! Soyez vigilant ! Cette procédure présente des risques de danger ! Ceux-ci sont identifiés par des symboles adjacents aux directives.

▲ **Identifie un message de sécurité particulier.**

☞ *Signifie NOTA ; n'est pas relatif à la sécurité.*



Ce groupe de symboles signifie Mise en garde ! Soyez vigilant ! Il y a des risques de danger reliés aux CHOCS ÉLECTRIQUES, aux PIÈCES EN MOUVEMENT et aux PIÈCES CHAUDES. Reportez-vous aux symboles et aux directives ci-dessous afin de connaître les mesures à prendre pour éviter tout danger.

## 1-2. Dangers relatifs au soudage à l'arc

▲ **Les symboles présentés ci-après sont utilisés tout au long du présent manuel pour attirer votre attention et identifier les risques de danger. Lorsque vous voyez un symbole, soyez vigilant et suivez les directives mentionnées afin d'éviter tout danger. Les consignes de sécurité présentées ci-après ne font que résumer l'information contenue dans les normes de sécurité énumérées à la section 1-5. Veuillez lire et respecter toutes ces normes de sécurité.**

▲ **L'installation, l'utilisation, l'entretien et les réparations ne doivent être confiés qu'à des personnes qualifiées.**

▲ **Au cours de l'utilisation, tenir toute personne à l'écart et plus particulièrement les enfants.**



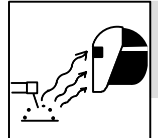
### UN CHOC ÉLECTRIQUE peut tuer.

Un simple contact avec des pièces électriques peut provoquer une électrocution ou des blessures graves. L'électrode et le circuit de soudage sont sous tension dès que l'appareil est sur ON. Le circuit d'entrée et les circuits internes de l'appareil sont également sous tension à ce moment-là. En soudage semi-automatique ou automatique, le fil, le dévidoir, le logement des galets d'entraînement et les pièces métalliques en contact avec le fil de soudage sont sous tension. Des matériels mal installés ou mal mis à la terre présentent un danger.

- Ne jamais toucher les pièces électriques sous tension.
- Porter des gants et des vêtements de protection secs ne comportant pas de trous.
- S'isoler de la pièce et de la terre au moyen de tapis ou d'autres moyens isolants suffisamment grands pour empêcher le contact physique éventuel avec la pièce ou la terre.
- Ne pas se servir de source électrique àcourant électrique dans les zones humides, dans les endroits confinés ou là où on risque de tomber.
- Se servir d'une source électrique àcourant électrique UNIQUEMENT si le procédé de soudage le demande.
- Si l'utilisation d'une source électrique àcourant électrique s'avère nécessaire, se servir de la fonction de télécommande si l'appareil en est équipé.
- Couper l'alimentation ou arrêter le moteur avant de procéder à l'installation, à la réparation ou à l'entretien de l'appareil. Déverrouiller l'alimentation selon la norme OSHA 29 CFR 1910.147 (voir normes de sécurité).
- Installer et mettre à la terre correctement cet appareil conformément à son manuel d'utilisation et aux codes nationaux, provinciaux et municipaux.
- Toujours vérifier la terre du cordon d'alimentation – Vérifier et s'assurer que le fil de terre du cordon d'alimentation est bien raccordé à la borne de terre du sectionneur ou que la fiche du cordon est raccordée à une prise correctement mise à la terre.
- En effectuant les raccordements d'entrée fixer d'abord le conducteur de mise à la terre approprié et contre-vérifier les connexions.
- Vérifier fréquemment le cordon d'alimentation pour voir s'il n'est pas endommagé ou dénudé – remplacer le cordon immédiatement s'il est endommagé – un câble dénudé peut provoquer une électrocution.
- Mettre l'appareil hors tension quand on ne l'utilise pas.
- Ne pas utiliser des câbles usés, endommagés, de grosseur insuffisante ou mal épissés.
- Ne pas enrouler les câbles autour du corps.
- Si la pièce soudée doit être mise à la terre, le faire directement avec un câble distinct – ne pas utiliser le connecteur de pièce ou le câble de retour.
- Ne pas toucher l'électrode quand on est en contact avec la pièce, la terre ou une électrode provenant d'une autre machine.
- N'utiliser qu'un matériel en bon état. Réparer ou remplacer sur-le-champ les pièces endommagées. Entretenir l'appareil conformément à ce manuel.
- Porter un harnais de sécurité quand on travaille en hauteur.
- Maintenir solidement en place tous les panneaux et capots.
- Fixer le câble de retour de façon à obtenir un bon contact métal-métal avec la pièce à souder ou la table de travail, le plus près possible de la soudure.
- Isoler la pince de masse quand pas mis à la pièce pour éviter le contact avec tout objet métallique.

**Une tension DC importante subsiste à l'intérieur des onduleurs après avoir coupé l'alimentation.**

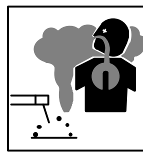
- Couper l'alimentation du poste et décharger les condensateurs d'entrée comme indiqué dans la Section Maintenance avant de toucher des composants.



### LES RAYONS DE L'ARC peuvent provoquer des brûlures dans les yeux et sur la peau.

Le rayonnement de l'arc du procédé de soudage génère des rayons visibles et invisibles intenses (ultraviolets et infrarouges) susceptibles de provoquer des brûlures dans les yeux et sur la peau. Des étincelles sont projetées pendant le soudage.

- Porter un casque de soudage muni d'un écran de filtre approprié pour protéger votre visage et vos yeux pendant le soudage ou pour regarder (voir ANSI Z49.1 et Z87.1 énuméré dans les normes de sécurité).
- Porter des protections approuvés pour les oreilles si le niveau sondre est trop élevé.
- Utiliser des écrans ou des barrières pour protéger des tiers de l'éclair et de l'éblouissement; demander aux autres personnes de ne pas regarder l'arc.
- Porter des vêtements de protection constitué dans une matière durable, résistant au feu (laine ou cuir) et une protection des pieds.



### LES FUMÉES ET LES GAZ peuvent être dangereux.

Le soudage génère des fumées et des gaz. Leur inhalation peut être dangereux pour votre santé.

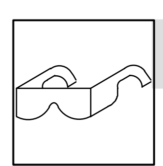
- Eloigner votre tête des fumées. Ne pas respirer les fumées.
- À l'interieur, ventiler la zone et/ou utiliser un échappement au niveau de l'arc pour l'évacuation des fumées et des gaz de soudage.
- Si la ventilation est insuffisante, utiliser un respirateur à alimentation d'air homologué.
- Lire les spécifications de sécurité des matériaux (MSDSs) et les instructions du fabricant concernant les métaux, les consommables, les revêtements, les nettoyants et les dégraisseurs.
- Travailler dans un espace fermé seulement s'il est bien ventilé ou en portant un respirateur à alimentation d'air. Demander toujours à un surveillant dûment formé de se tenir à proximité. Des fumées et des gaz de soudage peuvent déplacer l'air et abaisser le niveau d'oxygène provoquant des blessures ou des accidents mortels. S'assurer que l'air de respiration ne présente aucun danger.
- Ne pas souder dans des endroits situés à proximité d'opérations de dégraissage, de nettoyage ou de pulvérisation. La chaleur et les rayons de l'arc peuvent réagir en présence de vapeurs et former des gaz hautement toxiques et irritants.
- Ne pas souder des métaux munis d'un revêtement, tels que l'acier galvanisé, plaqué en plomb ou au cadmium à moins que le revêtement n'ait été enlevé dans la zone de soudure, que l'endroit soit bien ventilé, et si nécessaire, en portant un respirateur à alimentation d'air. Les revêtements et tous les métaux renfermant ces éléments peuvent dégager des fumées toxiques en cas de soudage.



### LE SOUDAGE peut provoquer un incendie ou une explosion.

Le soudage effectué sur des conteneurs fermés tels que des réservoirs, tambours ou des conduites peut provoquer leur éclatement. Des étincelles peuvent être projetées de l'arc de soudure. La projection d'étincelles, des pièces chaudes et des équipements chauds peut provoquer des incendies et des brûlures. Le contact accidentel de l'électrode avec des objets métalliques peut provoquer des étincelles, une explosion, un surchauffement ou un incendie. Avant de commencer le soudage, vérifier et s'assurer que l'endroit ne présente pas de danger.

- Se protéger et d'autres personnes de la projection d'étincelles et de métal chaud.
- Ne pas souder dans un endroit là où des étincelles peuvent tomber sur des substances inflammables.
- Déplacer toutes les substances inflammables à une distance de 10,7 m de l'arc de soudage. En cas d'impossibilité les recouvrir soigneusement avec des protections homologués.
- Des étincelles et des matériaux chauds du soudage peuvent facilement passer dans d'autres zones en traversant de petites fissures et des ouvertures.
- Surveiller tout déclenchement d'incendie et tenir un extincteur à proximité.
- Le soudage effectué sur un plafond, plancher, paroi ou séparation peut déclencher un incendie de l'autre côté.
- Ne pas effectuer le soudage sur des conteneurs fermés tels que des réservoirs, tambours, ou conduites, à moins qu'ils n'aient été préparés correctement conformément à AWS F4.1 (voir les normes de sécurité).
- Brancher le câble sur la pièce le plus près possible de la zone de soudage pour éviter le transport du courant sur une longue distance par des chemins inconnus éventuels en provoquant des risques d'électrocution et d'incendie.
- Ne pas utiliser le poste de soudage pour dégeler des conduites gelées.
- En cas de non utilisation, enlever la baguette d'électrode du porte-électrode ou couper le fil à la pointe de contact.
- Porter des vêtements de protection dépourvus d'huile tels que des gants en cuir, une chemise en matériau lourd, des pantalons sans revers, des chaussures hautes et un couvre chef.
- Avant de souder, retirer toute substance combustible de vos poches telles qu'un allumeur au butane ou des allumettes.



### DES PARTICULES VOLANTES peuvent blesser les yeux.

- Le soudage, l'écaillement, le passage de la pièce à la brosse en fil de fer, et le meulage génèrent des étincelles et des particules métalliques volantes. Pendant la période de refroidissement des soudures, elles risquent de projeter du laitier.
- Porter des lunettes de sécurité avec écrans latéraux ou un écran facial.



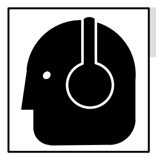
### LES ACCUMULATIONS DE GAZ risquent de provoquer des blessures ou même la mort.

- Fermer l'alimentation du gaz protecteur en cas de non utilisation.
- Veiller toujours à bien aérer les espaces confinés ou se servir d'un respirateur d'adduction d'air homologué.



### DES PIÈCES CHAUDES peuvent provoquer des brûlures graves.

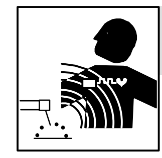
- Prévoir une période de refroidissement avant d'effectuer des travaux d'entretien.
- Porter des gants et des vêtements de protection pour travailler sur un moteur chaud.
- Ne pas toucher à mains nues les parties chaudes du moteur ni les pièces récemment soudées.



### LE BRUIT peut affecter l'ouïe.

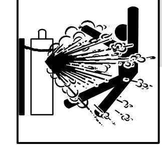
Le bruit des processus et des équipements peut affecter l'ouïe.

- Porter des protections approuvés pour les oreilles si le niveau sondre est trop élevé.



### LES CHAMPS MAGNÉTIQUES peuvent affecter les stimulateurs cardiaques.

- Porteurs de stimulateur cardiaque, restez à distance.
- Les porteurs d'un stimulateur cardiaque doivent d'abord consulter leur médecin avant de s'approcher des opérations de soudage à l'arc, de gougeage ou de soudage par points.



### Si des BOUTEILLES sont endommagées, elles pourront exploser.

Des bouteilles de gaz protecteur contiennent du gaz sous haute pression. Si une bouteille est endommagée, elle peut exploser. Du fait que les bouteilles de gaz font normalement partie du procédé de soudage, les manipuler avec précaution.

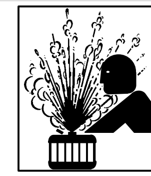
- Protéger les bouteilles de gaz comprimé d'une chaleur excessive, des chocs mécaniques, du laitier, des flammes ouvertes, des étincelles et des arcs.
- Placer les bouteilles debout en les fixant dans un support stationnaire ou dans un porte-bouteilles pour les empêcher de tomber ou de se renverser.
- Tenir les bouteilles éloignées des circuits de soudage ou autres circuits électriques.
- Ne jamais placer une torche de soudage sur une bouteille à gaz.
- Une électrode de soudage ne doit jamais entrer en contact avec une bouteille.
- Ne jamais souder une bouteille pressurisée – risque d'explosion.
- Utiliser seulement des bouteilles de gaz protecteur, régulateurs, tuyaux et raccords convenables pour cette application spécifique; les maintenir ainsi que les éléments associés en bon état.
- Ne pas tenir la tête en face de la sortie en ouvrant la soupape de la bouteille.
- Maintenir le chapeau de protection sur la soupape, sauf en cas d'utilisation ou de branchement de la bouteille.
- Lire et suivre les instructions concernant les bouteilles de gaz comprimé, les équipements associés et les publication P-1 CGA énumérées dans les normes de sécurité.

## 1-3. Dangers existant en relation avec le moteur



### LE CARBURANT MOTEUR peut provoquer un incendie ou une explosion.

- Arrêter le moteur avant de vérifier le niveau de carburant ou de faire le plein.
- Ne pas faire le plein en fumant ou proche d'une source d'étincelles ou d'une flamme nue.
- Ne pas faire le plein de carburant à ras bord; prévoir de l'espace pour son expansion.
- Faire attention de ne pas renverser de carburant. Nettoyer tout carburant renversé avant de faire démarrer le moteur.
- Jeter les chiffons dans un récipient ignifuge.



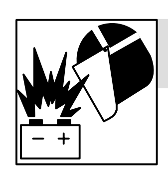
### LA VAPEUR ET LE LIQUIDE DE REFROIDISSEMENT CHAUD peuvent provoquer des brûlures.

- Il est préférable de vérifier le liquide de refroidissement une fois le moteur refroidi pour éviter de se brûler.
- Toujours vérifier le niveau de liquide de refroidissement dans le vase d'expansion (si présent), et non dans le radiateur (sauf si précisé autrement dans la section maintenance du manuel du moteur).
- Si le moteur est chaud et que le liquide doit être vérifié, opérer comme suivant :
- Mettre des lunettes de sécurité et des gants, placer un torchon sur le bouchon du radiateur.
- Dévisser le bouchon légèrement et laisser la vapeur s'échapper avant d'enlever le bouchon.



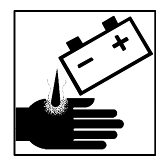
### DES ORGANES MOBILES peuvent provoquer des blessures.

- Ne pas approcher les mains des ventilateurs, courroies et autres pièces en mouvement.
- Maintenir fermés et fixement en place les portes, panneaux, recouvrements et dispositifs de protection.
- Arrêter le moteur avant d’installer ou brancher l’appareil.
- Demander seulement à un personnel qualifié d’enlever les dispositifs de sécurité ou les recouvrements pour effectuer, s’il y a lieu, des travaux d’entretien et de dépannage.
- Pour empêcher tout démarrage accidentel pendant les travaux d’entretien, débrancher le câble négatif (–) de batterie de la borne.
- Ne pas approcher les mains, cheveux, vêtements lâches et outils des organes mobiles.
- Remettre en place les panneaux ou les dipositifs de protection et fermer les portes à la fin des travaux d’entretien et avant de faire démarrer le moteur.
- Avant d’intervenir, déposer les bougies ou injecteurs pour éviter la mise en route accidentelle du moteur.
- Bloquer le volant moteur pour éviter sa rotation lors d’une intervention sur le générateur.



### L’EXPLOSION DE LA BATTERIE peut RENDRE AVEUGLE.

- Toujours porter une protection faciale, des gants en caoutchouc et vêtements de protection lors d’une intervention sur la batterie.
- Arrêter le moteur avant de débrancher ou de brancher les câbles de batterie.
- Eviter de provoquer des étincelles avec les outils en travaillant sur la batterie.
- Ne pas utiliser le poste de soudage pour charger les batteries ou des véhicules de démarrage rapide.
- Observer la polarité correcte (+ et –) sur les batteries.
- Débrancher le câble négatif (–) en premier lieu. Le rebrancher en dernier lieu.



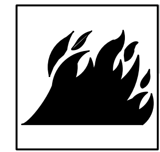
### L’ACIDE DE LA BATTERIE peut provoquer des brûlures dans les YEUX et sur la PEAU.

- Ne pas renverser la batterie.
- Remplacer une batterie endommagée.
- Rincer immédiatement les yeux et la peau à l’eau.



### LES GAZ D’ÈCHAPPEMENT DU MOTEUR peuvent provoquer des accidents mortels.

- Utiliser l’équipement à l’extérieur dans des zones ouvertes et bien ventilées.
- En cas d’utilisation dans un endroit fermé évacuer les gaz d’échappement du moteur vers l’extérieur à distance des entrées d’air dans les bâtiments.



### LA CHALEUR DU MOTEUR peut provoquer un incendie.

- Ne pas placer l’appareil sur, au-dessus ou à proximité de surfaces inflammables.
- Tenir à distance les produits inflammables de l’échappement.



### LES ÉTINCELLES À L’ÉCHAPPEMENT peuvent provoquer un incendie.

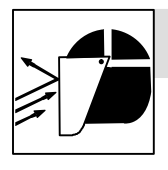
- Empêcher les étincelles d’échappement du moteur de provoquer un incendie.
- Utiliser uniquement un pare-étincelles approuvé – voir codes en vigueur.

## 1-4. Dangers supplémentaires en relation avec l’installation, le fonctionnement et la maintenance



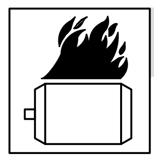
### LA CHUTE DE L’APPAREIL peut blesser.

- Utiliser l’anneau de levage uniquement pour soulever l’appareil lui-même ; sans chariot, de bouteilles de gaz, remorque, ou autres accessoires.
- Utiliser un équipement de levage de capacité suffisante pour lever l’appareil.
- En utilisant des fourches de levage pour déplacer l’unité, s’assurer que les fourches sont suffisamment longues pour dépasser du côté opposé de l’appareil.



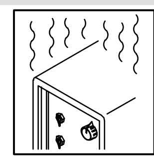
### LES ÉTINCELLES VOLANTES risquent de provoquer des blessures.

- Porter un écran facial pour protéger le visage et les yeux.
- Affuterr l’électrode au tungstène uniquement à la meuleuse dotée de protecteurs. Cette manoeuvre est à exécuter dans un endroit sûr lorsque l’on porte l’équipement homologué de protection du visage, des mains et du corps.
- Les étincelles risquent de causer un incendie – éloigner toute substance inflammable.



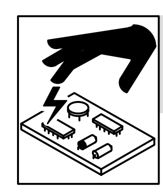
### LE SURCHAUFFEMENT peut endommager le moteur électrique.

- Arrêter ou déconnecter l’équipement avant de démarrer ou d’arrêter le moteur.
- Ne pas laisser tourner le moteur trop lentement sous risque d’endommager le moteur électrique à cause d’une tension et d’une fréquence trop faibles.
- Ne pas brancher de moteur de 50 ou de 60 Hz à la prise de 100 Hz, s’il y a lieu.



### L’EMPLOI EXCESSIF peut SURCHAUFFER L’ÉQUIPEMENT.

- Laisser l’équipement refroidir ; respecter le facteur de marche nominal.
- Réduire le courant ou le facteur de marche avant de poursuivre le soudage.
- Ne pas obstruer les passages d’air du poste.



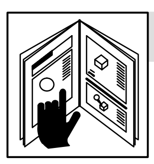
### LES CHARGES ÉLECTROSTATIQUES peuvent endommager les circuits imprimés.

- Établir la connexion avec la barrette de terre avant de manipuler des cartes ou des pièces.
- Utiliser des pochettes et des boîtes antistatiques pour stocker, déplacer ou expédier des cartes de circuits imprimes.



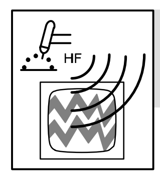
### UNE REMORQUE QUI BASCULE peut entraîner des blessures.

- Utiliser les supports de la remorque ou des blocs pour soutenir le poids.
- Installer convenablement le poste sur la remorque comme indiqué dans le manuel s’y rapportant.



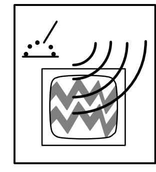
### LIRE LES INSTRUCTIONS.

- Utiliser seulement les pièces de rechange d’origine.
- Effecteur la maintenance et la mise en service d’après le manuel et celui du moteur.




### LE RAYONNEMENT HAUTE FRÉQUENCE (H.F.) risque de provoquer des interférences.

- Le rayonnement haute fréquence (H.F.) peut provoquer des interférences avec les équipements de radio–navigation et de communication, les services de sécurité et les ordinateurs.
- Demander seulement à des personnes qualifiées familiarisées avec des équipements électroniques de faire fonctionner l'installation.
- L'utilisateur est tenu de faire corriger rapidement par un électricien qualifié les interférences résultant de l'installation.
- Si le FCC signale des interférences, arrêter immédiatement l'appareil.
- Effectuer régulièrement le contrôle et l'entretien de l'installation.
- Maintenir soigneusement fermés les portes et les panneaux des sources de haute fréquence, maintenir les éclateurs à une distance correcte et utiliser une terre et et un blindage pour réduire les interférences éventuelles.



### LE SOUDAGE À L'ARC risque de provoquer des interférences.

- L'énergie électromagnétique risque de provoquer des interférences pour l'équipement électronique sensible tel que les ordinateurs et l'équipement commandé par ordinateur tel que les robots.
- Veiller à ce que tout l'équipement de la zone de soudage soit compatible électromagnétiquement.
- Pour réduire la possibilité d'interférence, maintenir les câbles de soudage aussi courts que possible, les grouper, et les poser aussi bas que possible (ex. par terre).
- Veiller à souder à une distance de 100 mètres de tout équipement électronique sensible.
- Veiller à ce que ce poste de soudage soit posé et mis à la terre conformément à ce mode d'emploi.
- En cas d'interférences après avoir pris les mesures précédentes, il incombe à l'utilisateur de prendre des mesures supplémentaires telles que le déplacement du poste, l'utilisation de câbles blindés, l'utilisation de filtres de ligne ou la pose de protecteurs dans la zone de travail.

## 1-5. Principales normes de sécurité

*Safety in Welding and Cutting,* norme ANSI Z49.1, de l'American Welding Society, 550 N.W. Lejeune Rd, Miami FL 33126

*Safety and Health Sandards,* OSHA 29 CFR 1910, du Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

*Recommended Safe Practice for the Preparation for Welding and Cutting of Containers That Have Held Hazardous Substances,* norme AWS F4.1, de l'American Welding Society, 550 N.W. Lejeune Rd, Miami FL 33126

*National Electrical Code,* NFPA Standard 70, de la National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

*Safe Handling of Compressed Gases in Cylinders,* CGA Pamphlet P-1, de la Compressed Gas Association, 1235 Jefferson Davis Highway, Suite 501, Arlington, VA 22202.

*Règles de sécurité en soudage, coupage et procédés connexes,* norme CSA W117.2, de l'Association canadienne de normalisation, vente de normes, 178 Rexdale Boulevard, Rexdale (Ontario) Canada M9W 1R3.

*Safe Practices For Occupation And Educational Eye And Face Protection*, norme ANSI Z87.1, de l'American National Standards Institute, 1430 Broadway, New York, NY 10018.

*Cutting and Welding Processes,* norme NFPA 51B, de la National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

## 1-6. Information sur les champs électromagnétiques

Données sur le soudage électrique et sur les effets, pour l'organisme, des champs magnétiques basse fréquence

Le courant de soudage, pendant son passage dans les câbles de soudage, causera des champs électromagnétiques. Il y a eu et il y a encore un certain souci à propos de tels champs. Cependant, après avoir examiné plus de 500 études qui ont été faites pendant une période de recherche de 17 ans, un comité spécial ruban bleu du National Research Council a conclu: "L'accumulation de preuves, suivant le jugement du comité, n'a pas démontré que l'exposition aux champs magnétiques et champs électriques à haute fréquence représente un risque à la santé humaine". Toutefois, des études sont toujours en cours et les preuves continuent à être examinées. En attendant que les conclusions finales de la recherche soient établies, il vous serait souhaitable de réduire votre exposition aux champs électromagnétiques pendant le soudage ou le coupage.

Afin de réduire les champs électromagnétiques dans l'environnement de travail, respecter les consignes suivantes :

1 Garder les câbles ensembles en les torsadant ou en les attachant avec du ruban adhésif.
2 Mettre tous les câbles du côté opposé de l'opérateur.
3 Ne pas courber pas et ne pas entourer pas les câbles autour de votre corps.
4 Garder le poste de soudage et les câbles le plus loin possible de vous.
5 Relier la pince de masse le plus près possible de la zone de soudure.

**Consignes relatives aux stimulateurs cardiaques :**

Les personnes qui portent un stimulateur cardiaque doivent avant tout consulter leur docteur. Si vous êtes déclaré apte par votre docteur, il est alors recommandé de respecter les consignes ci–dessus.

# SECTION 2 – DEFINITIONS

## 2-1. Symbol Definitions

| | | | |
|---|---|---|---|
| Stop Engine | Fast (Run, Weld/Power) | Fast/Slow (Run/Idle) | Slow (Idle) |
| Start Engine | Panel/Local | Temperature | Fuel |
| Engine Oil | On | Check Valve Clearance | Battery (Engine) |
| Engine | Read Operator's Manual | A Amperes | V Volts |
| MIG (GMAW), Wire | Stick (SMAW) | TIG (GTAW) | Circuit Breaker |
| Positive | Negative | Alternating Current (AC) | Output |
| Time | h Hours | s Seconds | Protective Earth (Ground) |
| Do not switch while welding | 14 Remote 14 Receptacle | Work Connection | Engine Choke |
| Wire Feed | Electrode Positive | Electrode Negative | |

# SECTION 3 – SPECIFICATIONS

## 3-1. Weld, Power, And Engine Specifications

| Welding Mode | Rated Welding Output | Maximum Open-Circuit Voltage | Amperage Range In CC Mode | Voltage Range In CV Mode | Auxiliary Power Rating | Fuel Capacity | Engine |
|---|---|---|---|---|---|---|---|
| CC/DC | 250 A, 25 V, 100% Duty Cycle | 80 | 40 – 250 A | 10 – 40 V | Continuous: 8 kVA/kW, 66.6/33.3 A, 120/240 V AC, 60 Hz, Single-Phase, Peak: 9 kVA/kW (w/Weld Contactor Off) | 10 gal (38 L) Tank | Onan P220 Air-Cooled, Two-Cylinder, Four-Cycle, 20 HP Gasoline Engine |
| CV/DC | 250 A, 25 V, 100% Duty Cycle | 50 | – – | | | | |
| CC/AC | 200 A, 25 V, 60% Duty Cycle | 75 | 40 – 200 A | | | | |

## 3-2. Dimensions, Weights, and Operating Angles

| Dimensions | |
|---|---|
| Height | 33 in (838 mm) |
| Width | 18-3/4 in (476 mm) |
| Depth | 45-1/2 in (1156 mm) |
| A | 18 in (457 mm) |
| B | 16-1/2 in (419 mm) |
| C | 3/4 in (19 mm) |
| D | 3-1/8 in (79 mm) |
| E | 32-3/4 in (832 mm) |
| F | 45-1/2 in (1156 mm) |
| G | 13/32 in (10 mm) Dia. |
| **Weight** | |
| 615 lb (279 kg) | |

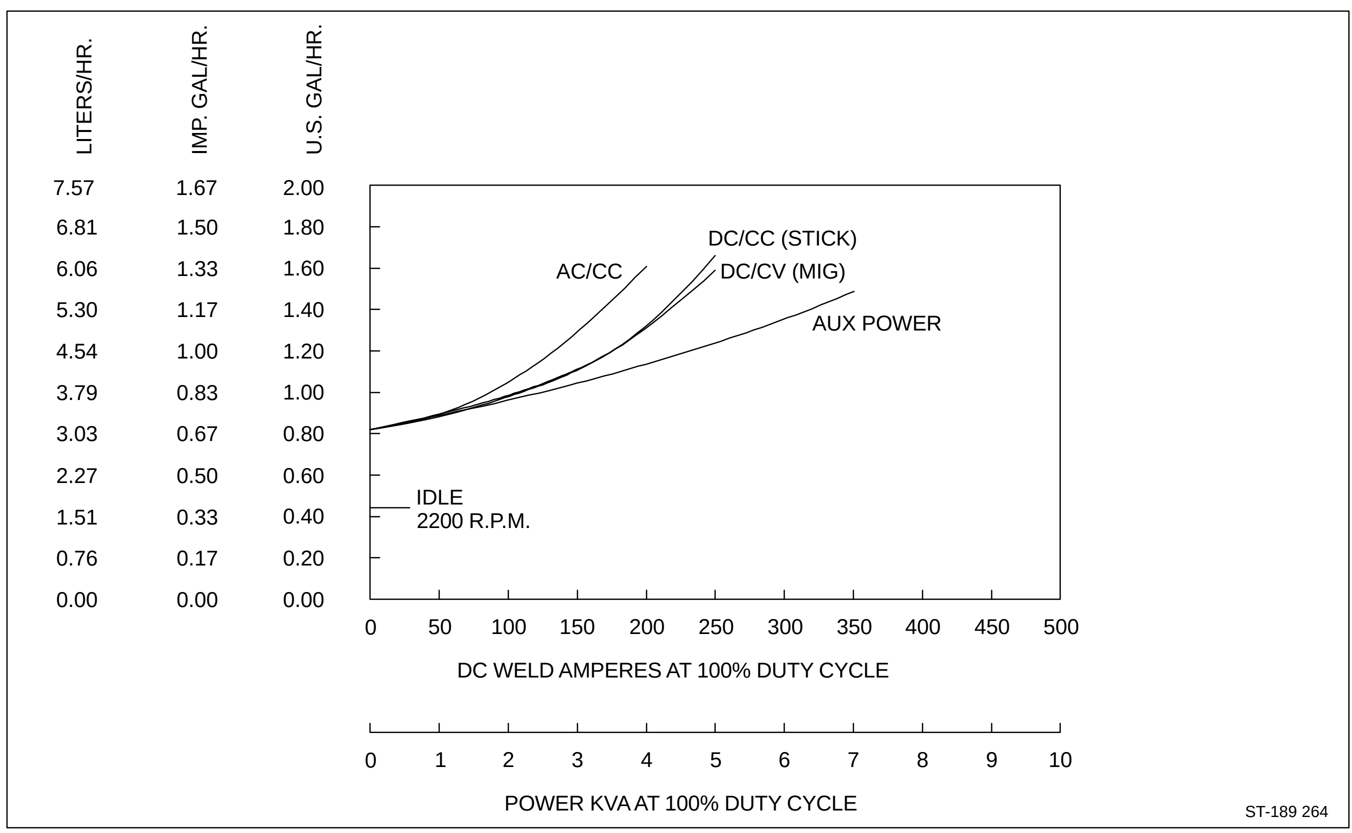
A
B
C
D
E
F
G
4 Holes
Engine End
ST-800 426

▲ **Do not exceed tilt angles or engine could be damaged or unit could tip.**

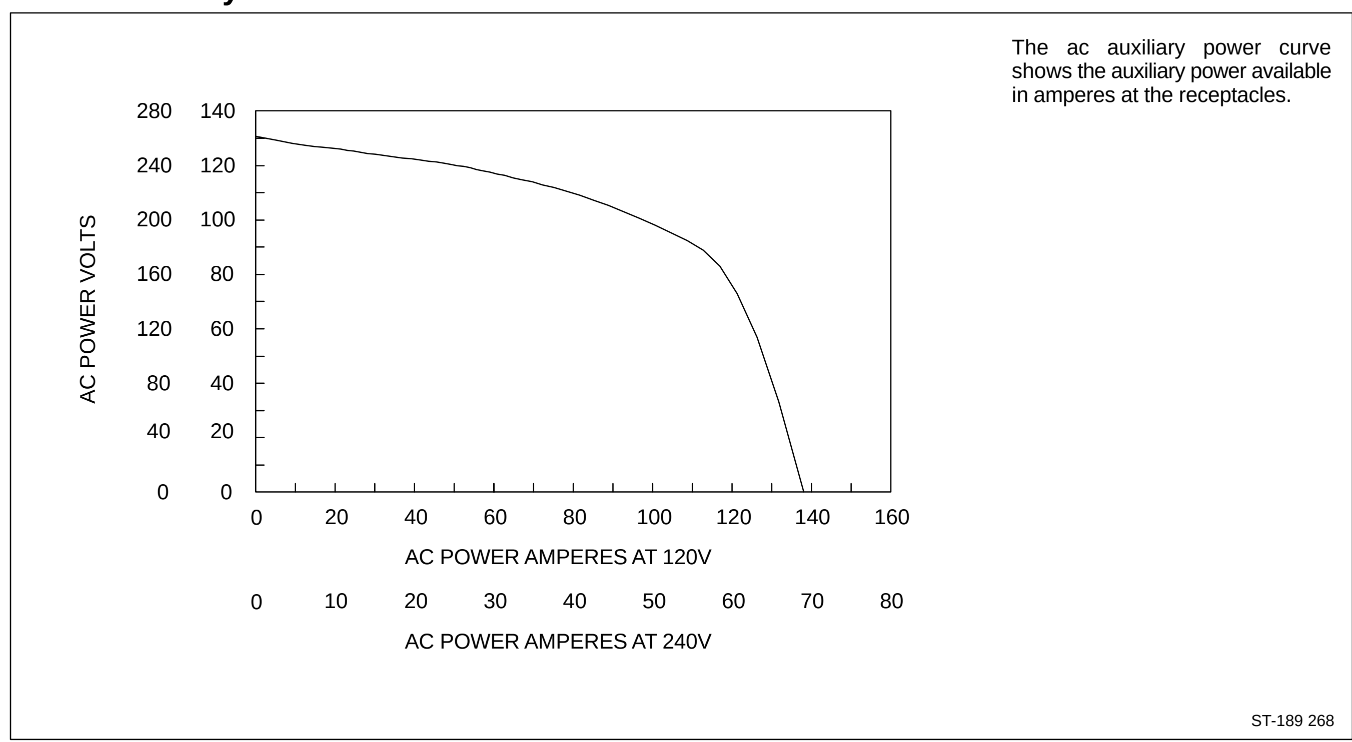
▲ **Do not move or operate unit where it could tip.**

25°
25°
25°
25°

## 3-3. Fuel Consumption



## 3-4. Auxiliary Power Curve




The ac auxiliary power curve shows the auxiliary power available in amperes at the receptacles.

## 3-5. Duty Cycle

**100% Duty Cycle at 250 Amperes DC**

Continuous Welding

WELD AMPERES

300
275
250
225
200
175
150

DC/CC
DC/CV
AC/CC

0 10 20 30 40 50 60 70 80 90 100

% DUTY CYCLE

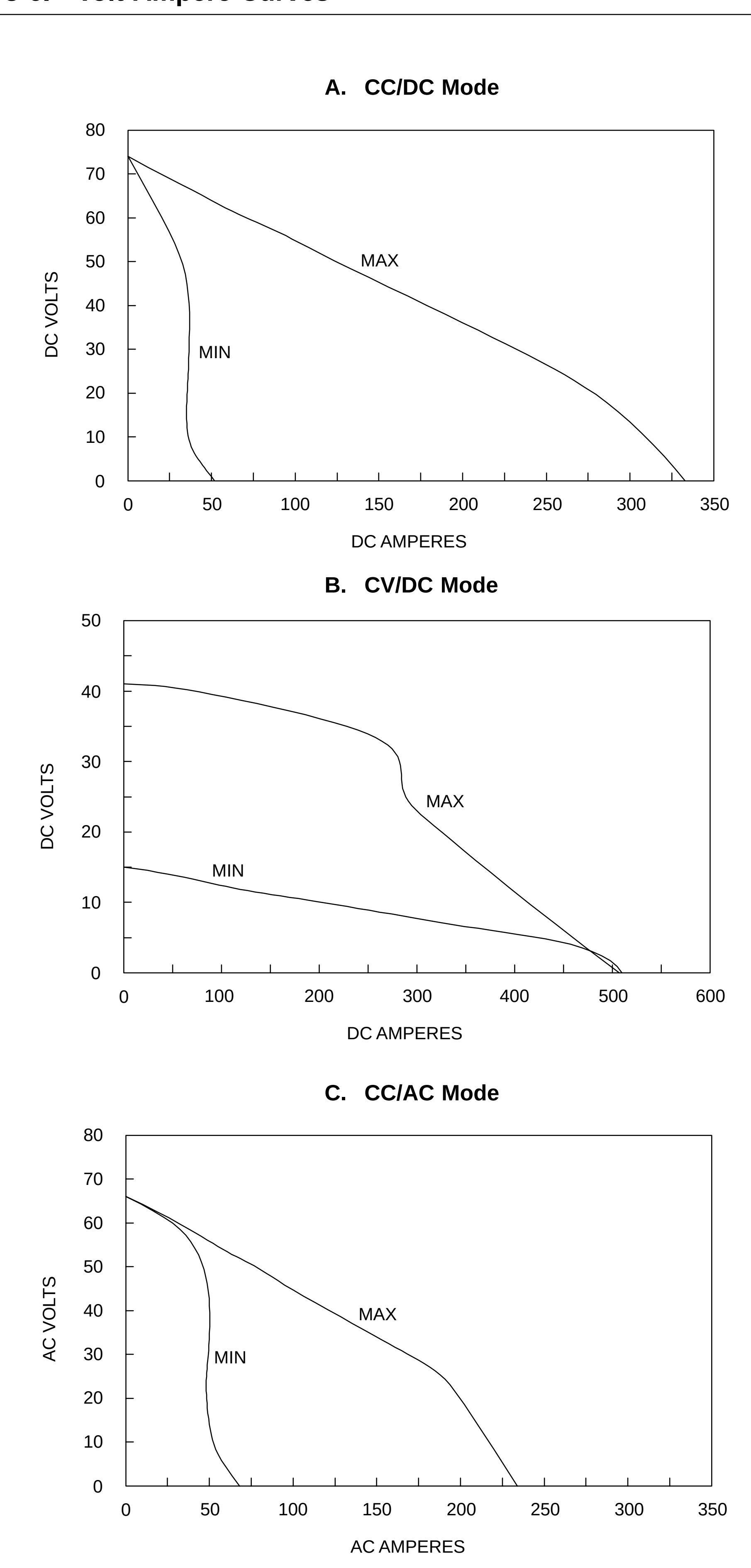
ST-182 298

Duty cycle is the percentage of 10 minutes that unit can weld at rated load without overheating.

▲ **Exceeding duty cycle can damage unit and void warranty.**

## 3-6. Volt-Ampere Curves

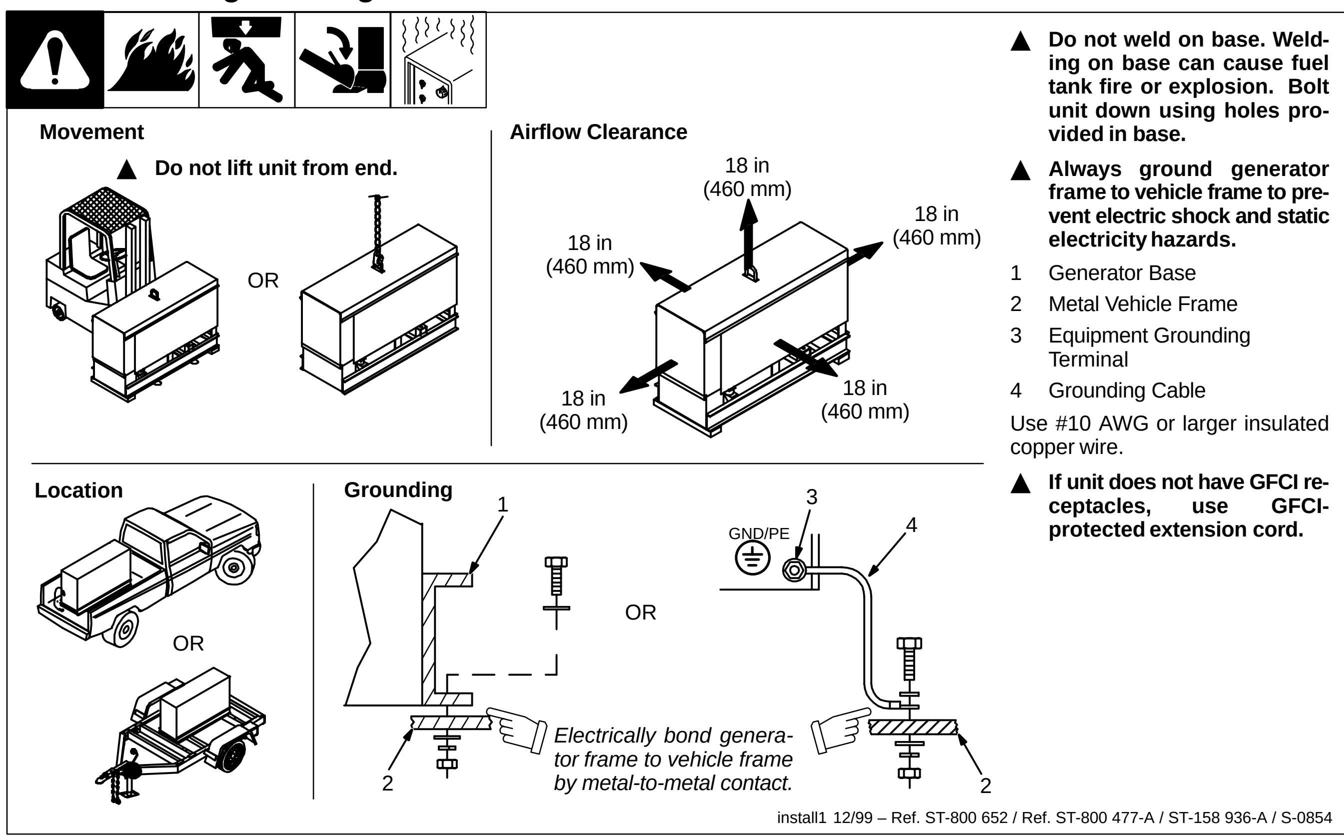
The volt-ampere curves show the minimum and maximum voltage and amperage output capabilities of the welding generator. Curves of other settings fall between the curves shown.




ST-189 266 / ST-189 267 / ST-189 265

# SECTION 4 – INSTALLATION

## 4-1. Installing Welding Generator




▲ **Do not weld on base. Welding on base can cause fuel tank fire or explosion. Bolt unit down using holes provided in base.**

▲ **Always ground generator frame to vehicle frame to prevent electric shock and static electricity hazards.**

1 Generator Base

2 Metal Vehicle Frame

3 Equipment Grounding Terminal

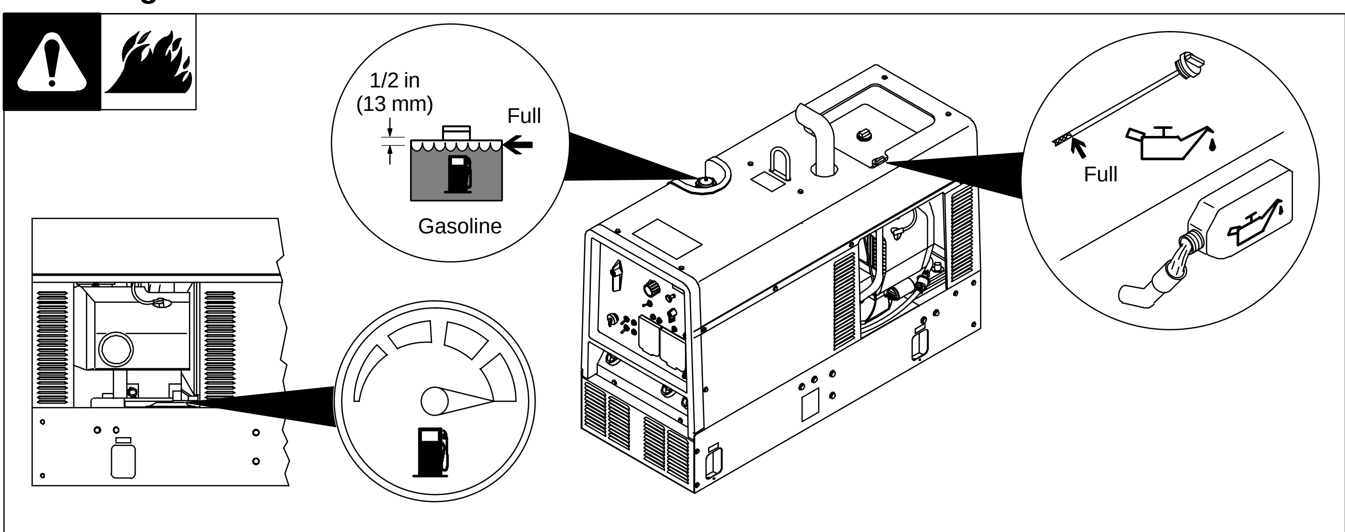
4 Grounding Cable

Use #10 AWG or larger insulated copper wire.

▲ **If unit does not have GFCI receptacles, use GFCI-protected extension cord.**

install1 12/99 – Ref. ST-800 652 / Ref. ST-800 477-A / ST-158 936-A / S-0854

## 4-2. Engine Prestart Checks




Ref. ST-151 983 / ST-801 942-C / Ref. ST-800 395

Check all fluids daily. Engine must be cold and on a level surface. Unit is shipped with 10W30 engine oil.

☞ *Follow run-in procedure in engine manual.*

☞ *This unit has a low oil pressure shutdown switch. However, some conditions may cause engine damage before the engine shuts down. Check oil level often and do not use the oil pressure shutdown system to monitor oil level.*

1 Fuel

Add fresh fuel before starting engine the first time (see maintenance label for specifications). Fill fuel tank up to 1/2 in. (13 mm) from top to allow room for expansion. Check fuel level on a cold engine before use each day.

2 Oil

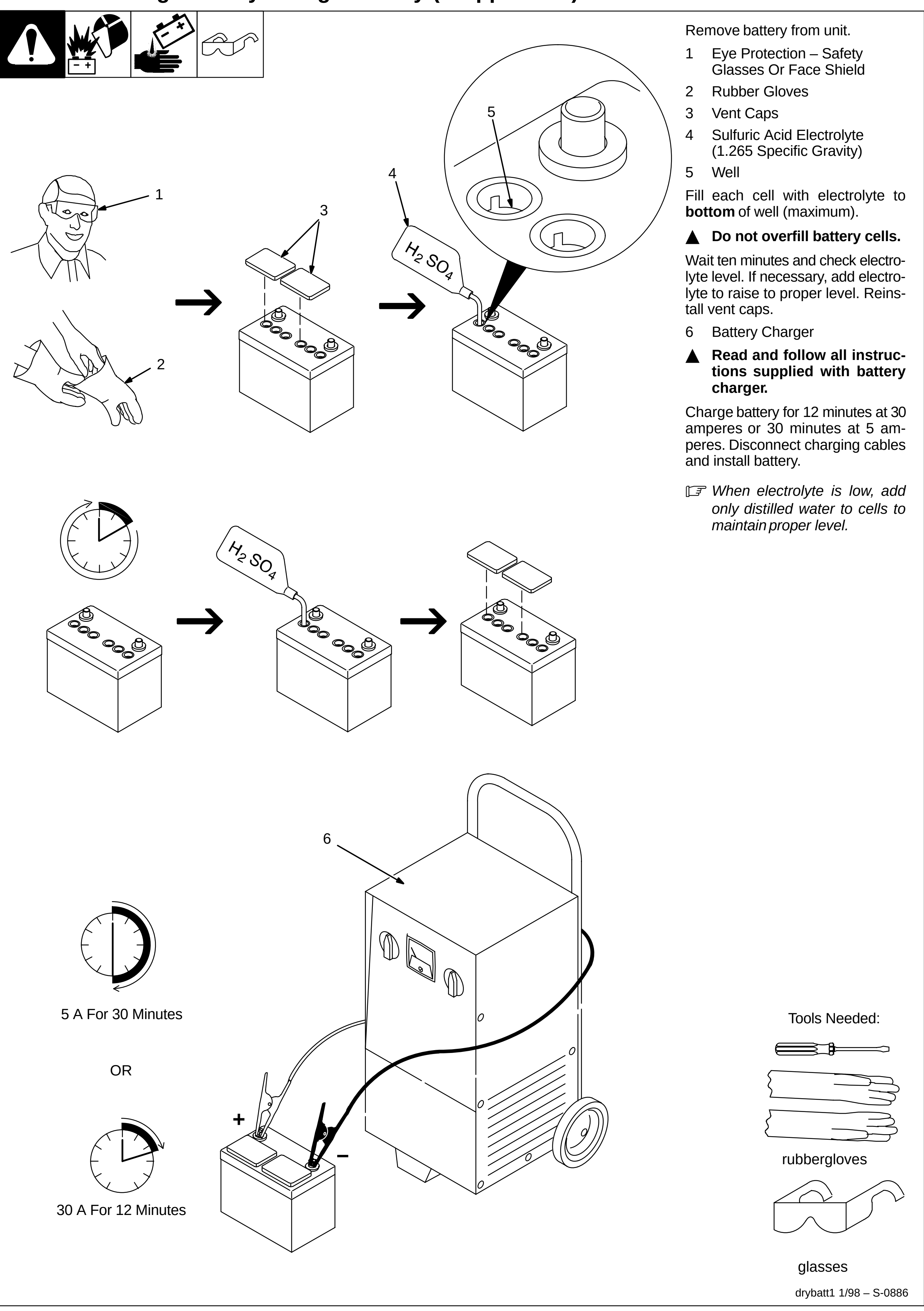
After fueling, check oil with unit on level surface. If oil is not up to full mark on dipstick, add oil (see maintenance label).

☞ *To improve cold weather starting:*

*Keep battery in good condition. Store battery in warm area off concrete surface.*

*Use correct grade oil for cold weather.*

## 4-3. Activating The Dry Charge Battery (If Applicable)




Remove battery from unit.

1 Eye Protection – Safety Glasses Or Face Shield

2 Rubber Gloves

3 Vent Caps

4 Sulfuric Acid Electrolyte (1.265 Specific Gravity)

5 Well

Fill each cell with electrolyte to **bottom** of well (maximum).

▲ **Do not overfill battery cells.**

Wait ten minutes and check electrolyte level. If necessary, add electrolyte to raise to proper level. Reinstall vent caps.

6 Battery Charger

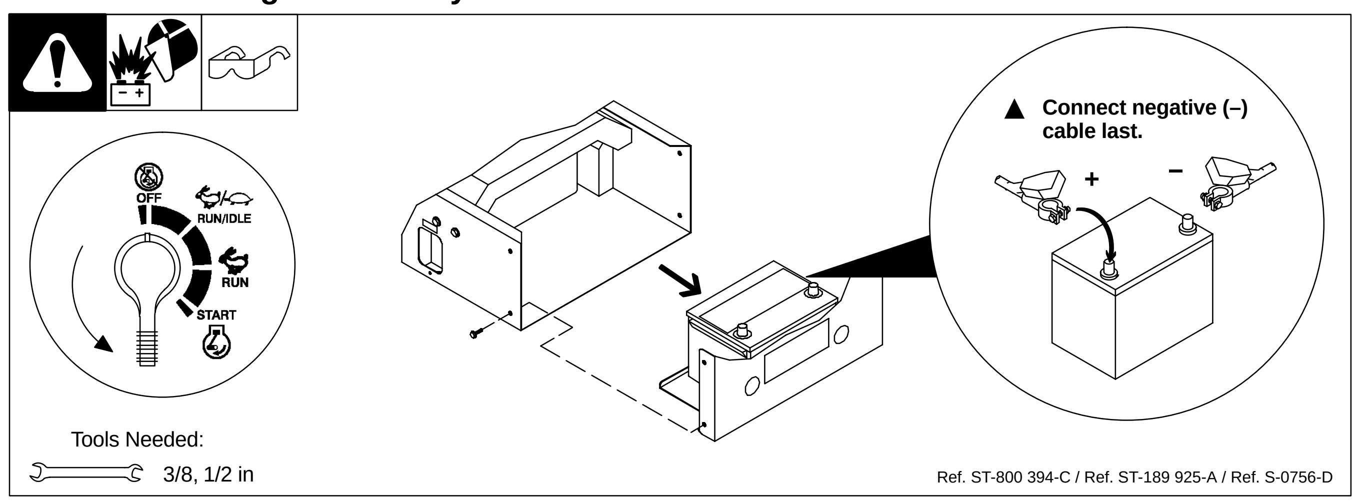
▲ **Read and follow all instructions supplied with battery charger.**

Charge battery for 12 minutes at 30 amperes or 30 minutes at 5 amperes. Disconnect charging cables and install battery.

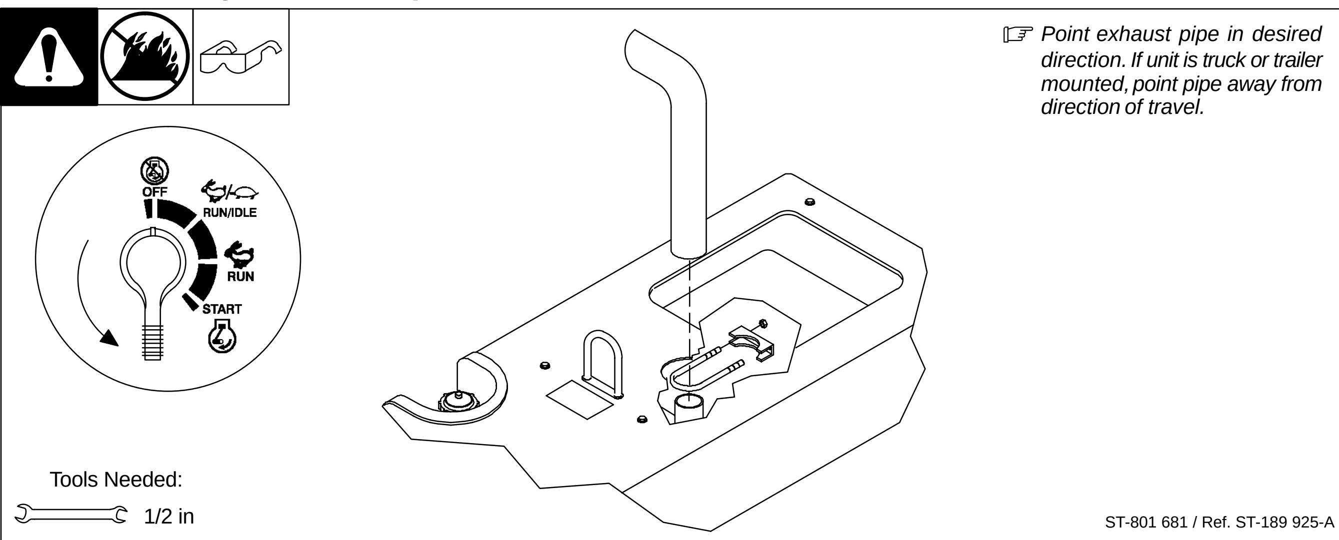
☞ *When electrolyte is low, add only distilled water to cells to maintain proper level.*

drybatt1 1/98 – S-0886

## 4-4. Connecting The Battery

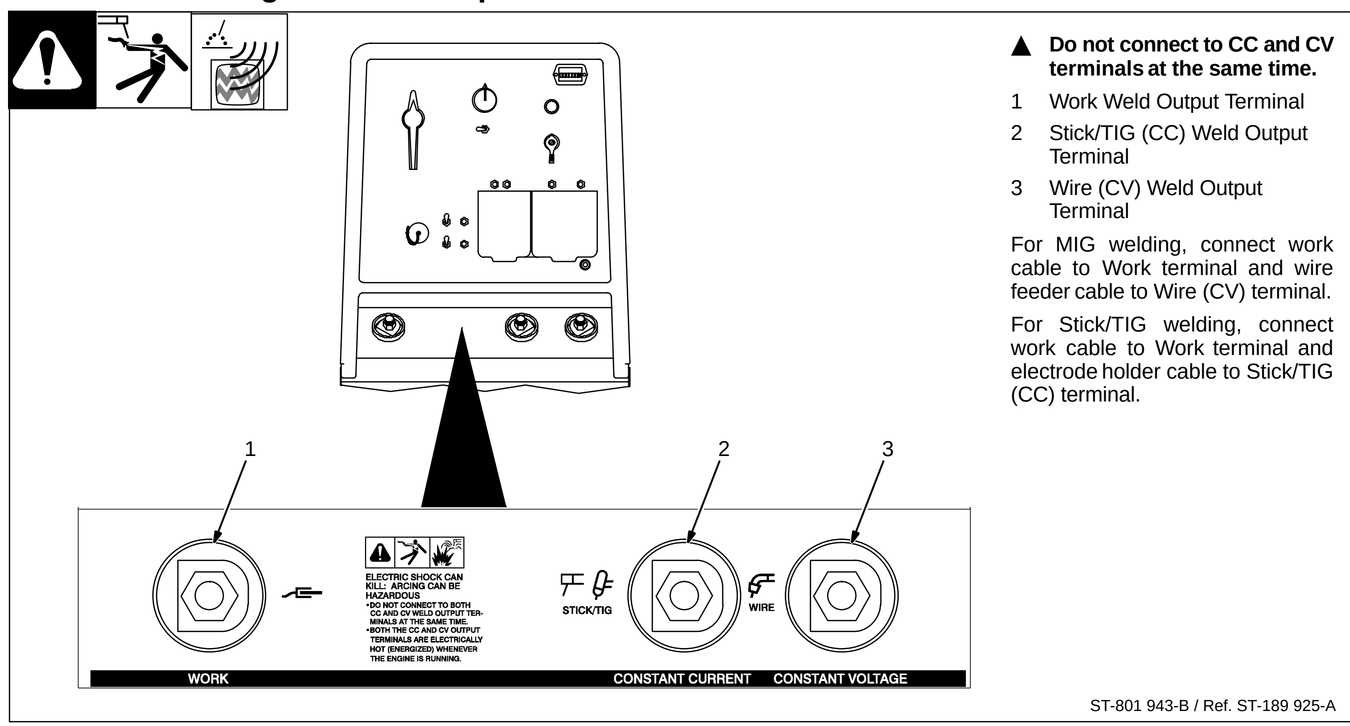



## 4-5. Installing Exhaust Pipe




☞ *Point exhaust pipe in desired direction. If unit is truck or trailer mounted, point pipe away from direction of travel.*

## 4-6. Connecting To Weld Output Terminals




▲ **Do not connect to CC and CV terminals at the same time.**

1 Work Weld Output Terminal

2 Stick/TIG (CC) Weld Output Terminal

3 Wire (CV) Weld Output Terminal

For MIG welding, connect work cable to Work terminal and wire feeder cable to Wire (CV) terminal.

For Stick/TIG welding, connect work cable to Work terminal and electrode holder cable to Stick/TIG (CC) terminal.

## 4-7. Selecting Weld Cable Sizes

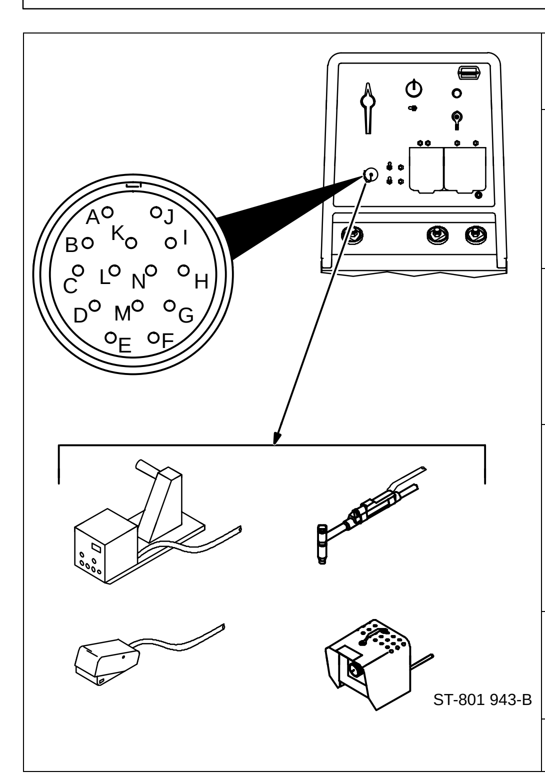
| Welding Amperes | Total Cable (Copper) Length In Weld Circuit Not Exceeding | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 100 ft (30 m) Or Less | | 150 ft (45 m) | 200 ft (60 m) | 250 ft (70 m) | 300 ft (90 m) | 350 ft (105 m) | 400 ft (120 m) |
| | 10 – 60% Duty Cycle | 60 – 100% Duty Cycle | 10 – 100% Duty Cycle | | | | | |
| 100 | 4 | 4 | 4 | 3 | 2 | 1 | 1/0 | 1/0 |
| 150 | 3 | 3 | 2 | 1 | 1/0 | 2/0 | 3/0 | 3/0 |
| 200 | 3 | 2 | 1 | 1/0 | 2/0 | 3/0 | 4/0 | 4/0 |
| 250 | 2 | 1 | 1/0 | 2/0 | 3/0 | 4/0 | 2-2/0 | 2-2/0 |
| 300 | 1 | 1/0 | 2/0 | 3/0 | 4/0 | 2-2/0 | 2-3/0 | 2-3/0 |
| 350 | 1/0 | 2/0 | 3/0 | 4/0 | 2-2/0 | 2-3/0 | 2-3/0 | 2-4/0 |

*Weld cable size (AWG) is based on either a 4 volts or less drop or a current density of at least 300 circular mils per ampere. Contact your distributor for the $mm^2$ equivalent weld cable sizes.

S-0007-E

## 4-8. Remote 14 Receptacle Information

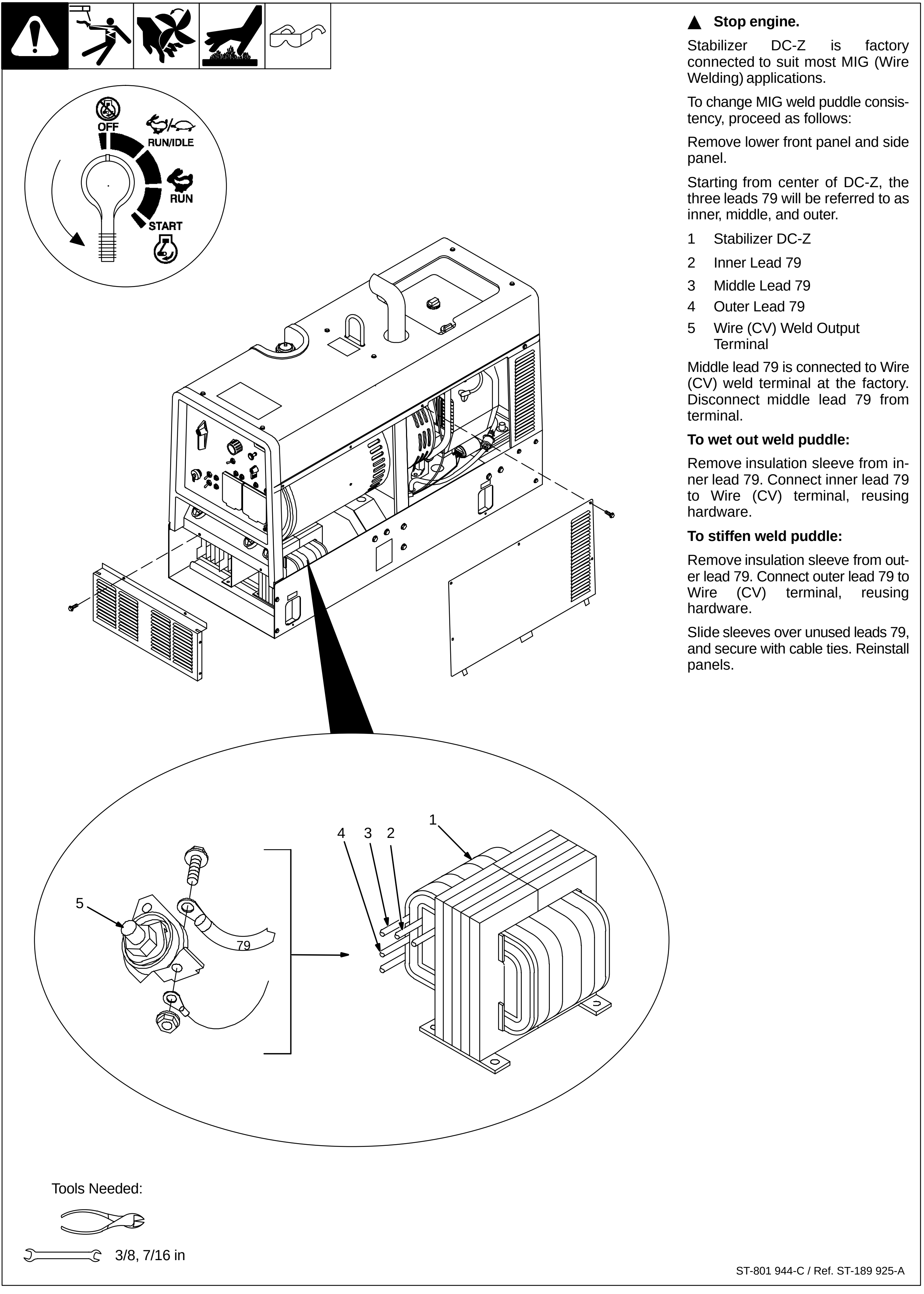
**NOTE** ☞ *Engine runs at weld/power speed whenever a device connected to the remote 14 receptacle is running.*




| REMOTE 14 | Socket* | Socket Information |
|---|---|---|
| 24 VOLTS AC OUTPUT (CONTACTOR) | A | 24 volts ac. |
| | B | Contact closure to A completes 24 volt ac contactor control circuit. Protected by circuit breaker CB5. |
| 115 VOLTS AC OUTPUT (CONTACTOR) | I | 115 volts ac. |
| | J | Contact closure to I completes 115 volt ac contactor control circuit. Protected by circuit breaker CB6. |
| A/V AMPERAGE VOLTAGE | C | 0 to +10 volts dc output to remote control. |
| | D | Remote control circuit common. |
| | E | 0 to +10 volts dc input command signal from remote control. |
| GND | G | Circuit common for 24 and 115 volt ac circuits. |
| | K | Chassis common. |

*The remaining sockets are not used.

## 4-9. Adjusting MIG Weld Puddle Consistency




▲ **Stop engine.**

Stabilizer DC-Z is factory connected to suit most MIG (Wire Welding) applications.

To change MIG weld puddle consistency, proceed as follows:

Remove lower front panel and side panel.

Starting from center of DC-Z, the three leads 79 will be referred to as inner, middle, and outer.

1 Stabilizer DC-Z

2 Inner Lead 79

3 Middle Lead 79

4 Outer Lead 79

5 Wire (CV) Weld Output Terminal

Middle lead 79 is connected to Wire (CV) weld terminal at the factory. Disconnect middle lead 79 from terminal.

**To wet out weld puddle:**

Remove insulation sleeve from inner lead 79. Connect inner lead 79 to Wire (CV) terminal, reusing hardware.

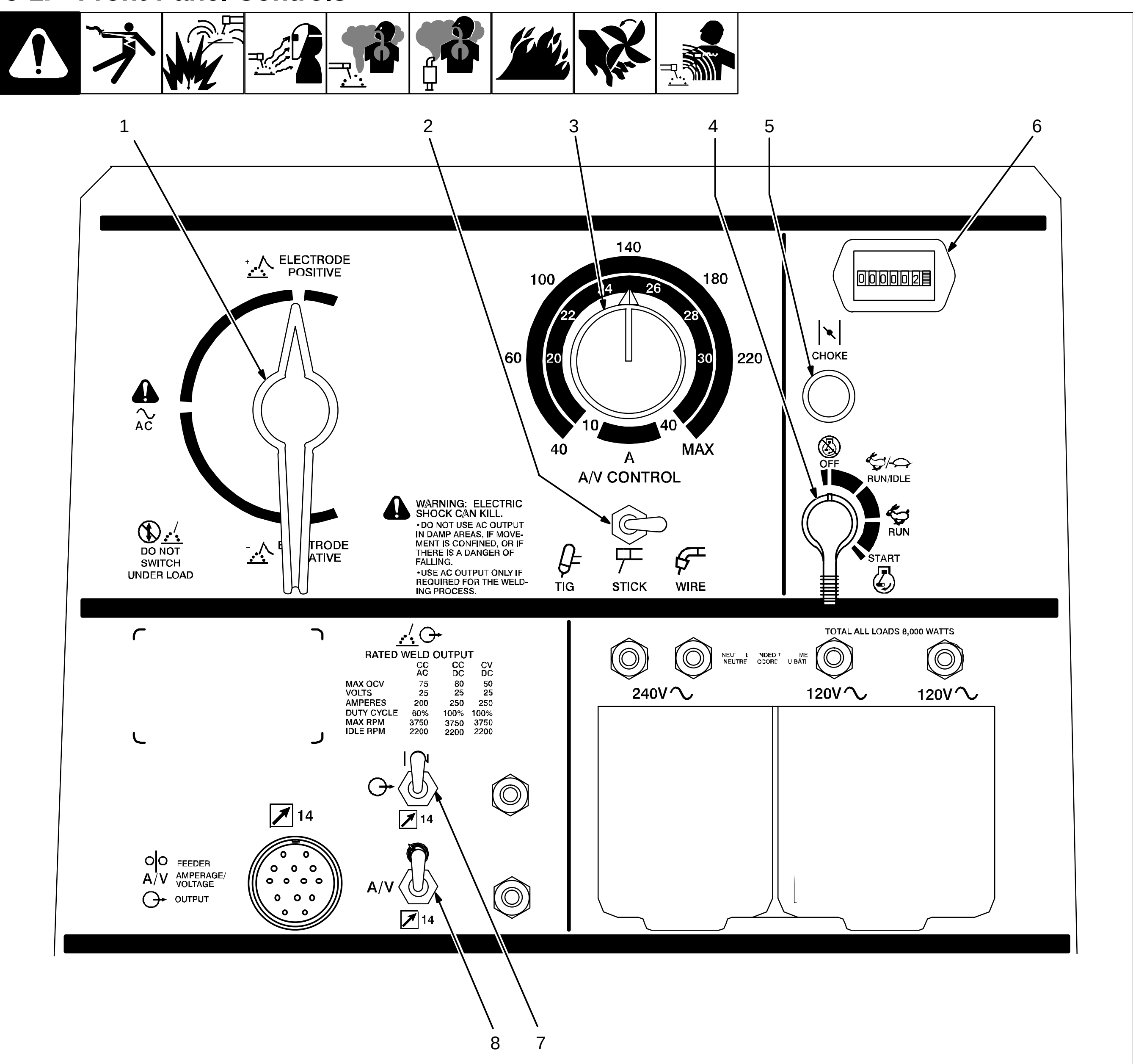
**To stiffen weld puddle:**

Remove insulation sleeve from outer lead 79. Connect outer lead 79 to Wire (CV) terminal, reusing hardware.

Slide sleeves over unused leads 79, and secure with cable ties. Reinstall panels.

# SECTION 5 – OPERATING WELDING GENERATOR

## 5-1. Front Panel Controls




1 DC Polarity/AC Switch

▲ **Do not switch under load.**

Use switch to select AC weld output or polarity of DC weld output.

2 Process Select Switch

▲ **Do not switch under load.**

Use switch to select output for weld process.

3 A/V Control

Use control to select weld voltage or amperage. Control may be adjusted while welding.

4 Engine Control Switch

Use switch to start engine, select speed, and stop engine. In Run/Idle position, engine runs at idle speed at no load, and weld/power speed under load. In Run position, engine runs at weld/power speed.

☞ *Place switch in Run position to operate most GMAW equipment.*

5 Engine Choke Control

Use control to change engine air-fuel mix.

**To Start**: pull out choke and turn Engine Control switch to Start position. Release switch and slowly push choke in when engine starts.

☞ *If the engine does not start, let the engine come to a complete stop before attempting restart.*

**To Stop**: turn Engine Control switch to Off position.

6 Engine Hour Meter

7 Output (Contactor) Switch

Use switch to control remote contactor if connected to remote 14 receptacle RC1 (see Section 5-2).

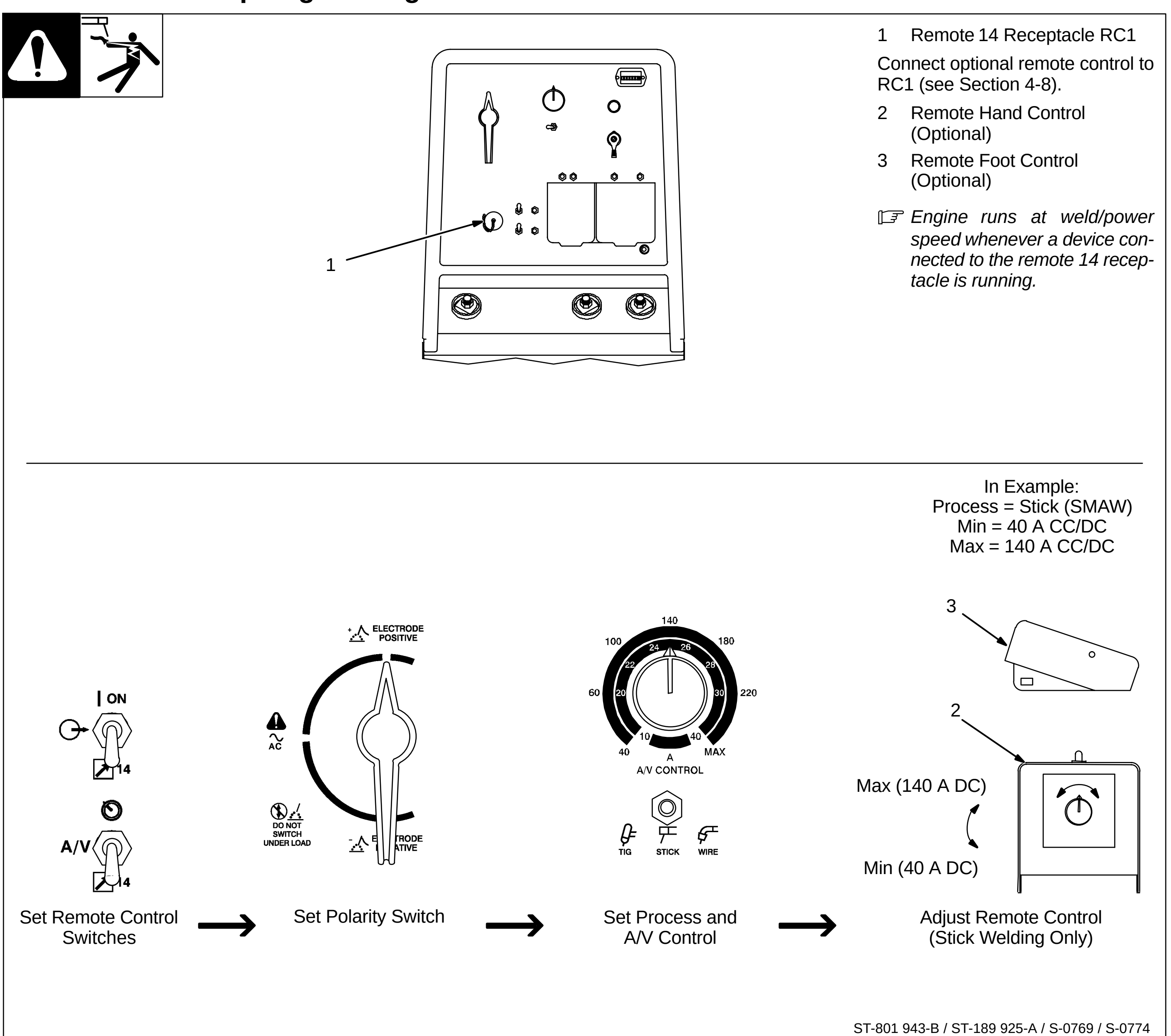
▲ **Weld output terminals are energized when Output (Contactor) switch is On and engine is running.**

8 Remote Amperage/Voltage Switch

Use switch to select front panel or remote amperage/voltage control (see Section 5-2).

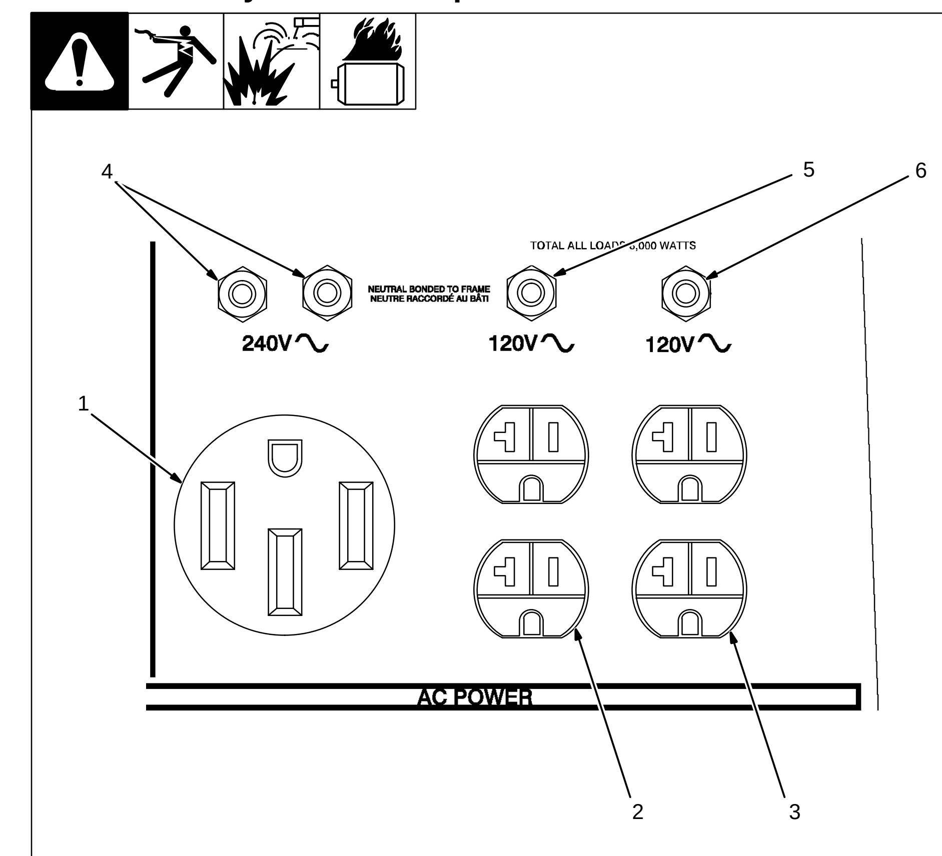
Ref. ST-189 925-A

## 5-2. Remote Amperage/Voltage Control



# SECTION 6 – OPERATING AUXILIARY EQUIPMENT

## 6-1. Auxiliary Power Receptacles And Circuit Breakers




**Simultaneous Welding And Auxiliary Power Output**

| Weld Current Amperes | Watts | 120 V Receptacle Amperes | 240 V Receptacle Amperes |
|---|---|---|---|
| 250 | 3500 | 31 | 15.5 |
| 225 | 4260 | 39 | 19 |
| 200 | 5140 | 46 | 23 |
| 150 | 6700 | 60 | 30 |
| 100 | 8000 | 62.4 | 31.2 |
| 50 | 8000 | 62.4 | 31.2 |
| 0 | 8000 | 62.4 | 31.2 |

▲ **If unit does not have GFCI receptacles, use GFCI-protected extension cord.**

☞ *Auxiliary power decreases as weld current increases.*

1 240 V 50 A AC Receptacle RC1

RC1 supplies 60 Hz single-phase power at weld/power speed. Maximum output is 8 kVA/kW.

2 120 V 20 A AC Duplex Receptacle RC2

3 120 V 20 A AC Duplex Receptacle RC3

RC2 and RC3 supply 60 Hz single-phase power at weld/power speed. Maximum output from RC2 or RC3 is 2.4 kVA/kW.

4 Circuit Breakers CB1 and CB2

CB1 and CB2 protect RC1 from overload. If CB1 or CB2 opens, RC1 and one of the 120 volt receptacles does not work. 120 volts may still be present at RC1.

5 Circuit Breaker CB3

6 Circuit Breaker CB4

CB3 protects RC2 and CB4 protects RC3 from overload. If a circuit breaker opens, the receptacle does not work.

☞ *Press button to reset circuit breaker. If breaker continues to open, contact Factory Authorized Service Agent.*

Combined output of all receptacles limited to 8 kVA/kW rating of the generator.

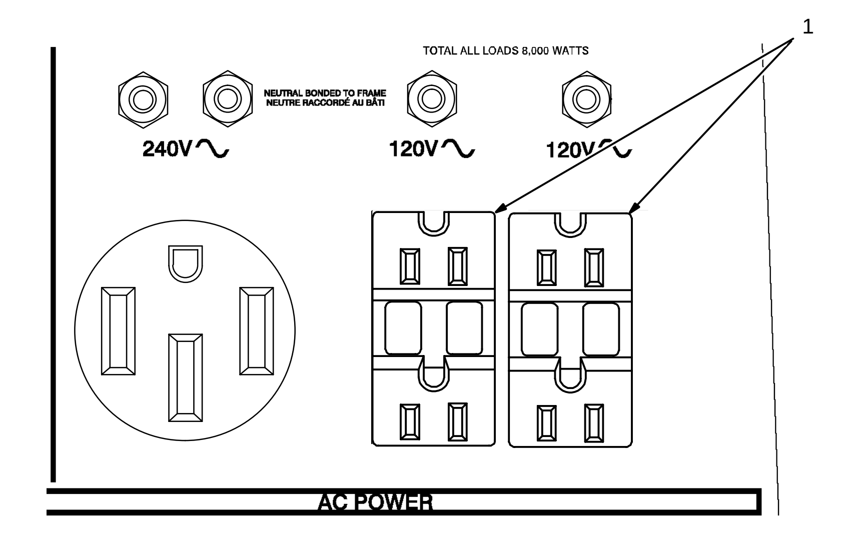
EXAMPLE: If 20 A is drawn from each 120 V duplex receptacle, only 13 A is available at the 240 V receptacle:

2 x (120 V x 20 A) + (240 V x 13 A) = 8 kVA/kW

Ref. ST-189 925-A

## 6-2. Optional Auxiliary Power Receptacles






**Simultaneous Welding And Auxiliary Power Output**

| Weld Current Amperes | Watts | 120 V Receptacle Amperes | 240 V Receptacle Amperes |
|---|---|---|---|
| 250 | 3500 | 31 | 15.5 |
| 225 | 4260 | 39 | 19 |
| 200 | 5140 | 46 | 23 |
| 150 | 6700 | 60 | 30 |
| 100 | 8000 | 62.4 | 31.2 |
| 50 | 8000 | 62.4 | 31.2 |
| 0 | 8000 | 62.4 | 31.2 |

▲ **If unit does not have GFCI receptacles, use GFCI-protected extension cord.**

☞ *Auxiliary power decreases as weld current increases.*

Combined output of all receptacles limited to 8 kVA/kW rating of the generator.

**GFCI Receptacle Option**

1 120 V 15 A AC GFCI Receptacles GFCI2 and GFCI3

GFCI2 and GFCI3 supply 60 Hz single-phase power at weld/power speed. Maximum output from GFCI2 or GFCI3 is 2.4 kVA/kW. Circuit breaker protection is the same as standard receptacles.

If a ground fault is detected, the GFCI Reset button pops out and the circuit opens to disconnect the faulty equipment. Check for damaged tools, cords, plugs, etc. connected to the receptacle. Press button to reset receptacle and resume operation.

☞ *At least once a month, run engine at weld/power speed and press Test button to verify GFCI is working properly.*

Ref. ST-189 925-A

# SECTION 7 – MAINTENANCE AND TROUBLESHOOTING

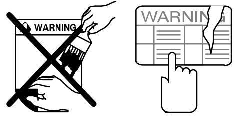
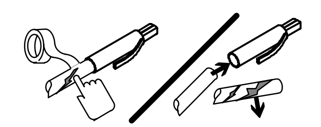
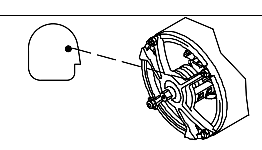
## 7-1. Routine Maintenance

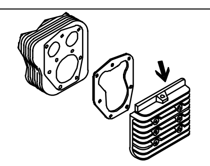
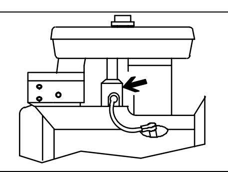
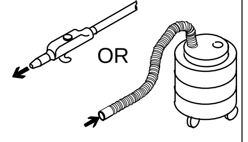
Recycle engine fluids.

▲ **Stop engine before maintaining.**

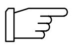
☞ *See Engine Manual and Maintenance Label. Service more often if used in severe conditions.*

* To be done by Factory Authorized Service Agent.

| | |
|---|---|
| **8 h** | |
| Check fluid levels. See Section 4-2. (OIL Full) | Wipe up spills. |
| **20 h** | **25 h** |
| Check and clean spark arrestor screen. See Section 7-4. | Service air filter wrapper (foam element). See Section 7-3. |
| **50 h** | |
| Clean cooling system. See engine manual. | Clean and tighten weld terminals. |
| **100 h** | |
| Change oil. See Section 7-5 and maintenance label. | Change oil filter. See Section 7-5 and maintenance label. |
| Service air filter element. See Section 7-3. | Clean and tighten battery connections. |
| **200 h** | |
| Check valve clearance.* | Replace fuel filter. See Section 7-5. |
| Check spark plugs. | Replace unreadable labels.   |
| **500 h** | |
| Repair or replace cracked cables.  | Service welding generator brushes and slip rings. Service more often in dirty conditions.*  |

| | | |
|---|---|---|
| **1000 h** | | |
| Remove cylinder head deposits.*  | Clean crankcase breather valve.  | Blow out or vacuum inside. During heavy service, clean monthly.   |

## 7-2. Maintenance Label

| NOTE  | *Follow the storage procedure in the engine owner's manual if the unit will not be used for an extended period.* |
|---|---|

**ONAN P216/P220 GAS ENGINE**

See Engine Manual for complete engine care. Give Engine Specification and Serial Number when ordering parts.

*Check Daily.*

To Drain Oil:
*Push And Turn CCW*
½ in. ID Hose
*Pull*

°C: +30, +20, +10, 0, -10, -20, -30
°F: +100, +80, +50, +30, 0
5W-30
10W-30
30

Recommended Oil . . . API Service Classification SF/CC, SG/CE, SH

Oil and Filter Change . . . . . . . . CONDITIONS

| | Normal | Severe |
|---|---|---|
| P216 ..... | 100 hours | 50 hours |
| P220 ..... | 50 hours | 50 hours |

Oil Filter . . . . . . . . . . . MILLER 065 251, Onan 122-0645

Oil Capacity . . . . . . . . 1.5 qt (1.4L) or 1.75 qt (1.6L) with filter change

*Gasoline*

Fuel Grade . . . . . . . . . . . Regular or Unleaded
Fuel Filter . . . . . . . . . . . MILLER 066 113, Onan 149-2206-01, Fram G10E1

Air Filter Service . . . . . . .100 hours or less - see Owner's Manual
Air Filter Element . . . . . . MILLER 064 617, Onan 140-2628-01
Air Filter Wrapper . . . . . .MILLER 065 653, Onan 140-1496

12 Volt Battery . . . . . . . . . . . . . . . . . . . . . BCI Group 58
Cranking Performance at 0°F (-18°C) . . . 430 Amps min.

Engine RPM - No Load
Weld/
Power . . . . 3700
Idle . . . . . . 2200

Valve Clearance - Cold
In. . . . .0.005 in (0.13 mm)
Ex. . . . 0.013 in (0.33 mm)
If using LP fuel system, check valve clearance at 50 hours; every 200 hours thereafter.

Spark Plug Gap . . . . . 0.025 in. (0.6 mm)
Spark Plug . . . . . . . . . Champion RS17YX Preferred or RS14YC
*Use only resistor spark plugs and wires.*

*Optional*

Spark Arrestor Inspection and Service . . . 20 operating hours- see Owner's Manual

165 623-G

## 7-3. Servicing Air Cleaner

OFF
RUN/IDLE
RUN
START

1
2

oil

▲ **Stop engine.**

▲ **Do not run engine without air cleaner or with dirty element.**

1 Wrapper (Foam Element)

Wash wrapper with soap and water solution. Allow wrapper to air dry completely.

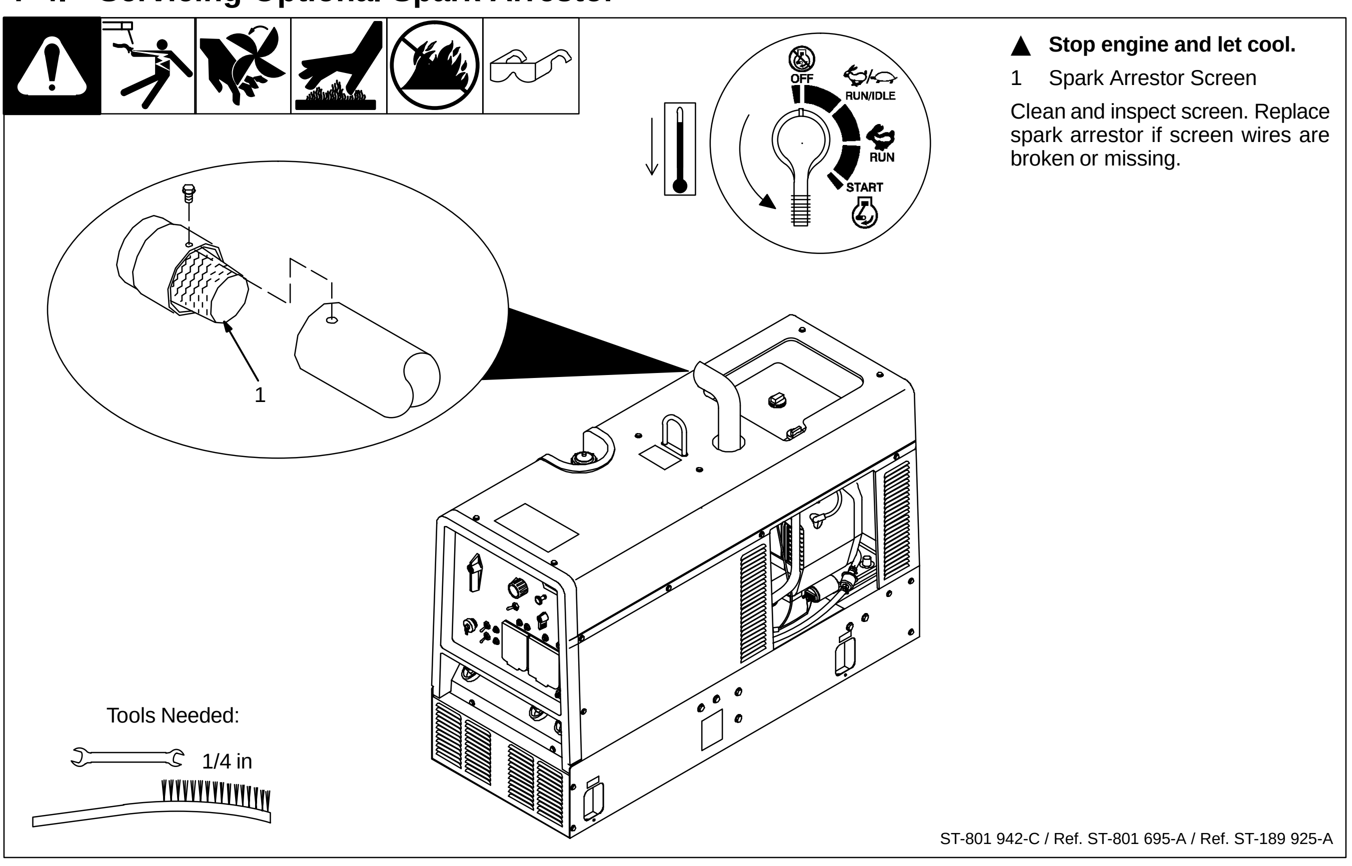
Spread 1 tablespoon SAE 30 oil evenly into wrapper. Squeeze out excess oil.

2 Element

Replace element if damaged, dirty, or oily.

aircleaner3 1/97 – ST-156 852 / Ref. ST-185 095-A / S-0759

## 7-4. Servicing Optional Spark Arrestor



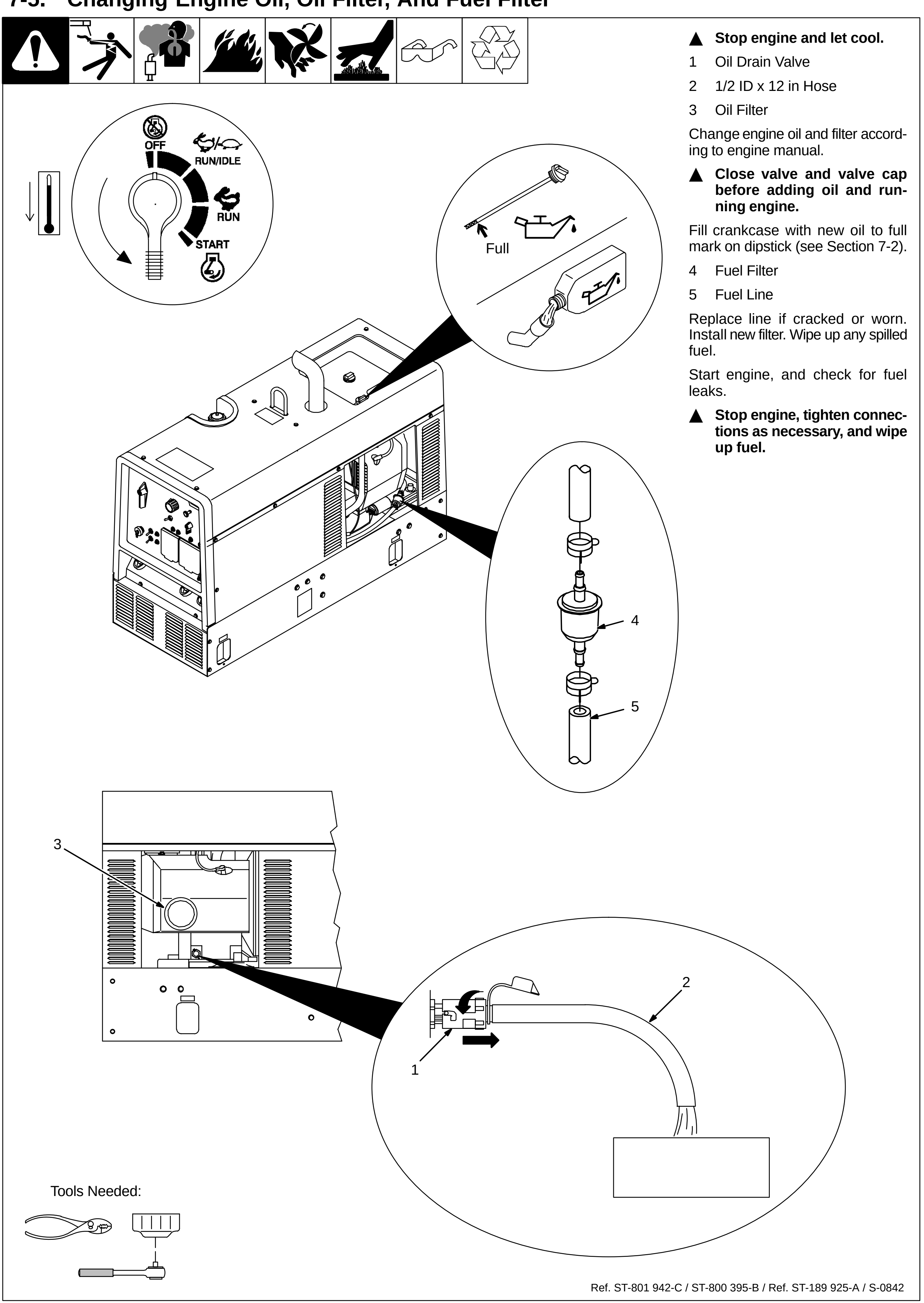

▲ **Stop engine and let cool.**

1 Spark Arrestor Screen

Clean and inspect screen. Replace spark arrestor if screen wires are broken or missing.

ST-801 942-C / Ref. ST-801 695-A / Ref. ST-189 925-A

## 7-5. Changing Engine Oil, Oil Filter, And Fuel Filter




▲ **Stop engine and let cool.**

1 Oil Drain Valve

2 1/2 ID x 12 in Hose

3 Oil Filter

Change engine oil and filter according to engine manual.

▲ **Close valve and valve cap before adding oil and running engine.**

Fill crankcase with new oil to full mark on dipstick (see Section 7-2).

4 Fuel Filter

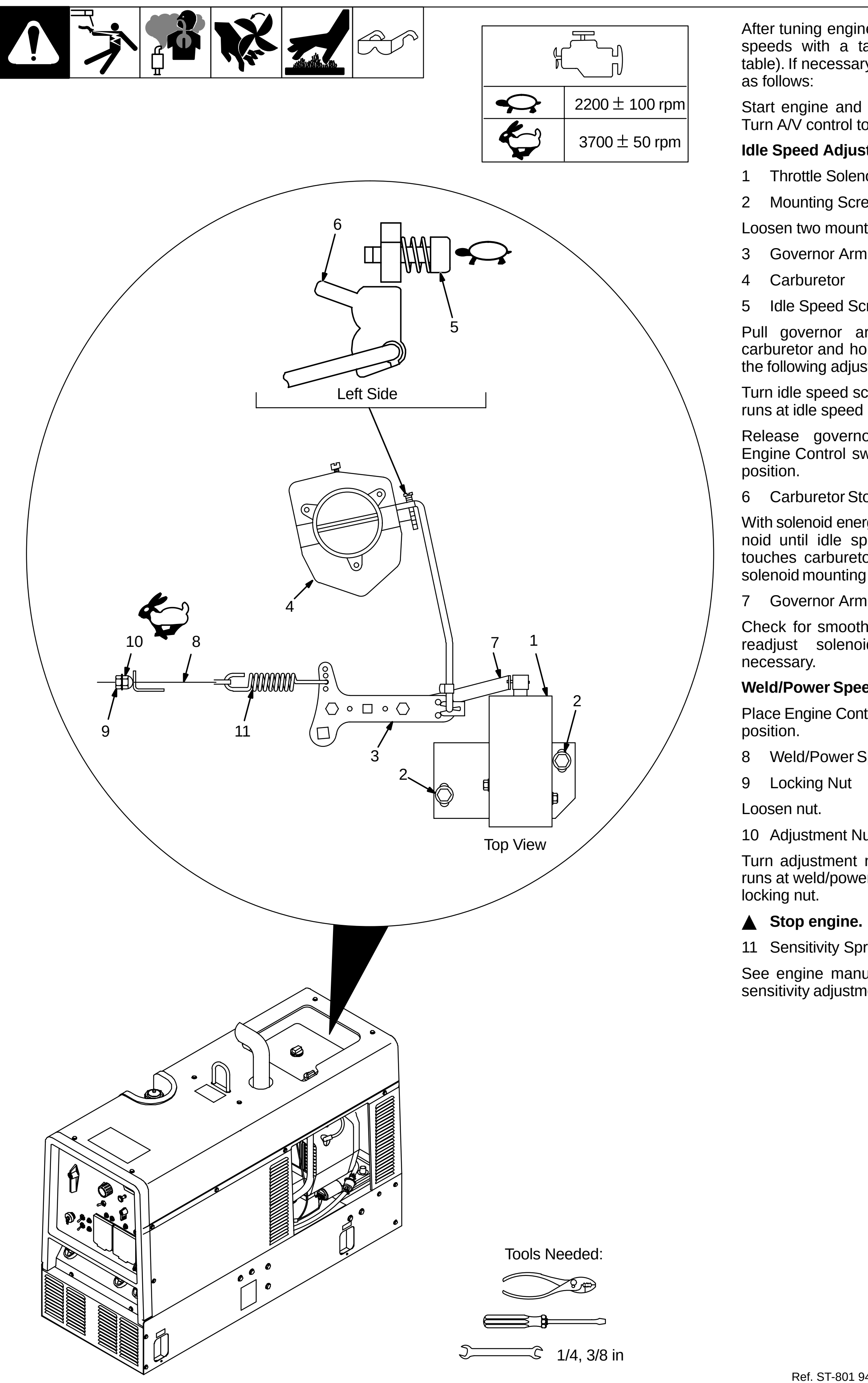
5 Fuel Line

Replace line if cracked or worn. Install new filter. Wipe up any spilled fuel.

Start engine, and check for fuel leaks.

▲ **Stop engine, tighten connections as necessary, and wipe up fuel.**

## 7-6. Adjusting Engine Speed




After tuning engine, check engine speeds with a tachometer (see table). If necessary, adjust speeds as follows:

Start engine and run until warm. Turn A/V control to max.

**Idle Speed Adjustment**

1 Throttle Solenoid

2 Mounting Screw

Loosen two mounting screws.

3 Governor Arm

4 Carburetor

5 Idle Speed Screw

Pull governor arm away from carburetor and hold while making the following adjustment:

Turn idle speed screw until engine runs at idle speed (see table).

Release governor arm. Place Engine Control switch in Run/Idle position.

6 Carburetor Stop

With solenoid energized, slide solenoid until idle speed screw just touches carburetor stop. Tighten solenoid mounting screws.

7 Governor Arm Extension

Check for smooth operation, and readjust solenoid position if necessary.

**Weld/Power Speed Adjustment**

Place Engine Control switch in Run position.

8 Weld/Power Speed Rod

9 Locking Nut

Loosen nut.

10 Adjustment Nut

Turn adjustment nut until engine runs at weld/power speed. Tighten locking nut.

▲ **Stop engine.**

11 Sensitivity Spring

See engine manual for governor sensitivity adjustment.

Ref. ST-801 942-C / ST-800 397-A

## 7-7. Overload Protection

Tools Needed:

3/8 in

▲ **Stop engine.**

☞ *When a circuit breaker or fuse opens, it usually indicates a more serious problem exists. Contact a Factory Authorized Service Agent.*

1 Circuit Breaker CB5

CB5 protects the 24 volt ac output to Remote 14 receptacle RC1. If CB5 opens, 24 volt ac output to RC1 stops.

2 Circuit Breaker CB6

CB6 protects the 115 volt ac output to Remote 14 receptacle RC1. If CB6 opens, 115 volt ac output to RC1 stops.

Press button to reset breaker.

3 Fuse F6 (See Parts List)

F6 protects the engine wiring system from overload. If F6 opens, engine will not crank.

4 Fuse F1 (See Parts List)

5 Fuse F2 (See Parts List)

Remove side panel.

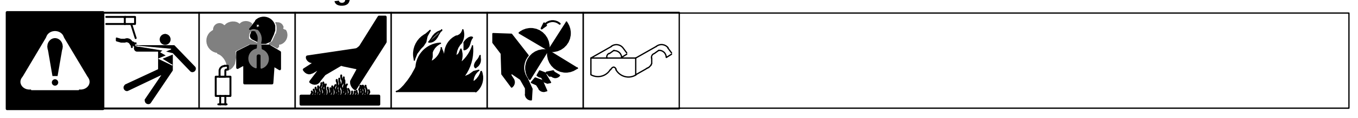
F1 protects the exciter excitation winding from overload. If F1 opens, weld and auxiliary power output stops.

F2 protects the stator winding from overload. If F2 opens, weld output stops. Auxiliary power will still be available.

Replace any open fuses. Reinstall cover before operating unit.

ST-801 945-C / Ref. ST-189 925-A

## 7-8. Troubleshooting



### A. Welding

| Trouble | Remedy |
|---|---|
| No weld output. | Check control settings. |
| | Check weld connections. |
| | Disconnect equipment from auxiliary power receptacles during start-up. |
| | Place Output (Contactor) switch in On position, or move switch to Remote 14 position and connect remote contactor to Remote 14 receptacle RC1 (see Sections 4-8 and 5-1). |
| | Check fuses F1 and F2, and replace if necessary (see Section 7-7). |
| | Have Factory Authorized Service Agent check brushes, slip rings, and field current control board PC2. |

| Trouble | Remedy |
|---|---|
| Low weld output. | Check control settings. |
| | Place Remote Amperage/Voltage switch in Panel position, or move switch to Remote 14 position and connect remote amperage/voltage control to Remote 14 receptacle RC1. |
| | Check and clean air cleaner as necessary (see Section 7-3). |
| | Check and adjust engine speed (see Section 7-6). |
| | Have Factory Authorized Service Agent check brushes, slip rings, and field current control board PC2. |
| | See engine manual. |
| High weld output. | Check control settings. |
| | Check and adjust engine speed (see Section 7-6). |
| | Check for obstructed movement of solenoid linkage (see Section 7-6). |
| | Have Factory Authorized Service Agent check field current control board PC2. |
| Weld output cannot be adjusted. | Check position of Remote Amperage/Voltage switch (see Section 5-1). |
| | Have Factory Authorized Service Agent check field current control board PC2. |
| Erratic weld output. | Check control settings. |
| | Clean and tighten connections both inside and outside unit. |
| | Check and secure lead connections to A/V control. |
| | Be sure connection to work piece is clean and tight. |
| | Remove excessive coils from weld cables. |
| | Use dry, properly stored electrodes. |
| | Check and adjust engine speed (see Section 7-6). |
| | Have Factory Authorized Service Agent check brushes, slip rings, and field current control board PC2. |
| Remote contactor control does not activate contactor. | Place Output (Contactor) switch in Remote 14 position (see Section 5-1). |
| | Check and tighten connections to Remote 14 receptacle RC1 (see Section 4-8). |
| No power output at Remote 14 receptacle RC1. | Reset circuit breaker CB1 and/or CB2 (see Section 7-7). |
| Lack of high frequency; difficulty in establishing Gas Tungsten Arc Welding arc. | Use proper size tungsten for welding amperage. |
| | Reduce leakage of high frequency from torch or work cable (check grounding, remove excessive coils from weld cables, use shorter weld cables, etc.). |
| | Check cables and torch for cracked or deteriorated insulation or bad connections. Repair or replace necessary parts. |
| Wandering arc – poor control of arc direction. | Reduce gas flow rate. |
| | Select proper size tungsten. Properly prepare tungsten. |
| Tungsten electrode oxidizing and not remaining bright after conclusion of weld. | Shield weld zone from drafts. |
| | Increase postflow time. |
| | Check and tighten all gas fittings. |
| | Properly prepare tungsten. |

## B. Auxiliary Power

| Trouble | Remedy |
|---|---|
| No power output. | Reset circuit breakers CB1, CB2, CB3 and/or CB4 (see Section 6-1). |
| | Check fuse F1, and replace if necessary (see Section 7-7). |
| | Have Factory Authorized Service Agent check brushes, slip rings, and field current control board PC2. |
| Low power output. | Check and clean air cleaner as necessary. |
| | Check and adjust engine speed (see Section 7-6). |
| | See engine manual. |
| High power output. | Check and adjust engine speed (see Section 7-6). |
| Erratic power output. | Have Factory Authorized Service Agent check brushes, slip rings, and field current control board PC2. |
| | Check receptacle wiring and connections. |
| | Check governor according to engine manual. |

## C. Engine

| Trouble | Remedy |
|---|---|
| Engine will not crank. | Check fuse F6, and replace if open (see Section 7-7). |
| | Check battery voltage. |
| | Check battery connections and tighten if necessary. |
| | Check plug PLG5 and plug PLG8 connections. |
| | Have Factory Authorized Service Agent check Engine Control switch S5. |
| Engine does not start. | Check fuel level (see Section 4-2). |
| | Check battery and replace if necessary. |
| | Check engine charging system according to engine manual. |
| | See engine manual. |
| Engine starts but stops when Engine Control switch returns to Run position. | Check oil level (see Section 4-2). |
| | Check and refill crankcase with proper viscosity oil for operating temperature, if necessary (see Section 7-2). |
| | Have Factory Authorized Service Agent check low oil pressure shutdown switch S5. |
| Battery discharges between uses. | Clean top of battery with baking soda and water solution; rinse with clear water. |
| | Periodically recharge battery (approximately every 3 months). |
| | Replace battery. |
| | Check voltage regulator according to engine manual. |
| Engine stopped during normal operation. | Check fuel level (see Section 4-2). |
| | Check oil level (see Section 4-2). |
| | Have Factory Authorized Service Agent check low oil pressure shutdown switch S5. |
| Engine does not return to idle speed. | Be sure Engine Control switch S2 is in Run/Idle position. |
| | Remove all weld and auxiliary power loads. |
| | Turn off remote device connected to Remote 14 receptacle RC1 (see Section 4-8). |
| | Check for obstructed movement of solenoid linkage (see Section 7-6). |
| | Have Factory Authorized Service Agent check idle module PC1 and current transformer CT1. |
| Engine does not remain at weld/power speed when power or weld load is applied with Engine Control switch in Run/Idle position. | Place Engine Control switch in the Run position for small loads. |

# SECTION 8 – ELECTRICAL DIAGRAM

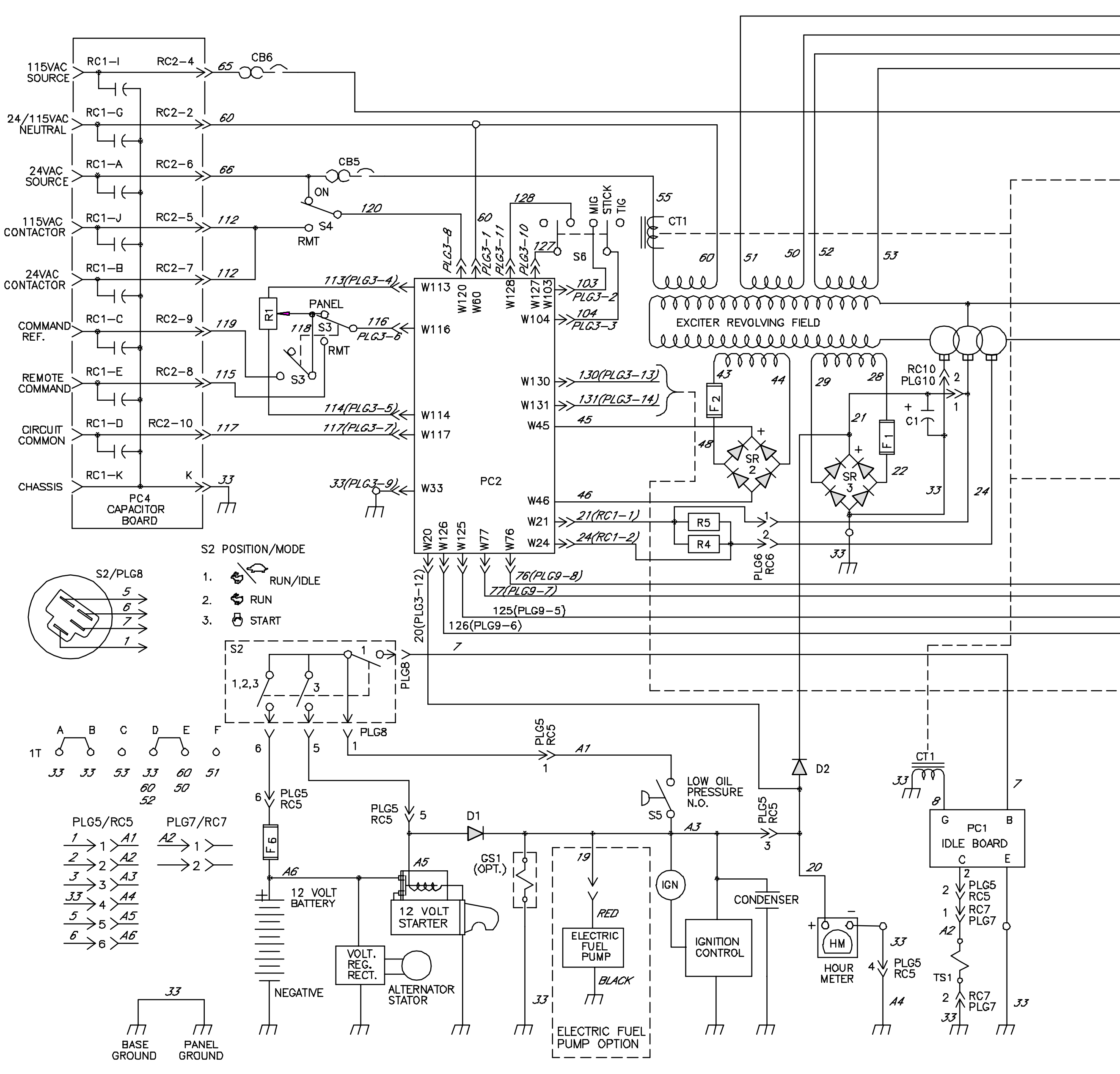
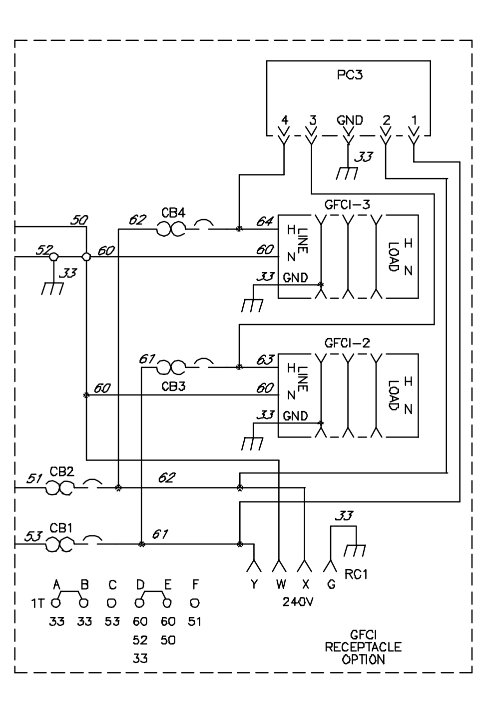



**Figure 8-1. Circuit Diagram For Welding Generator**

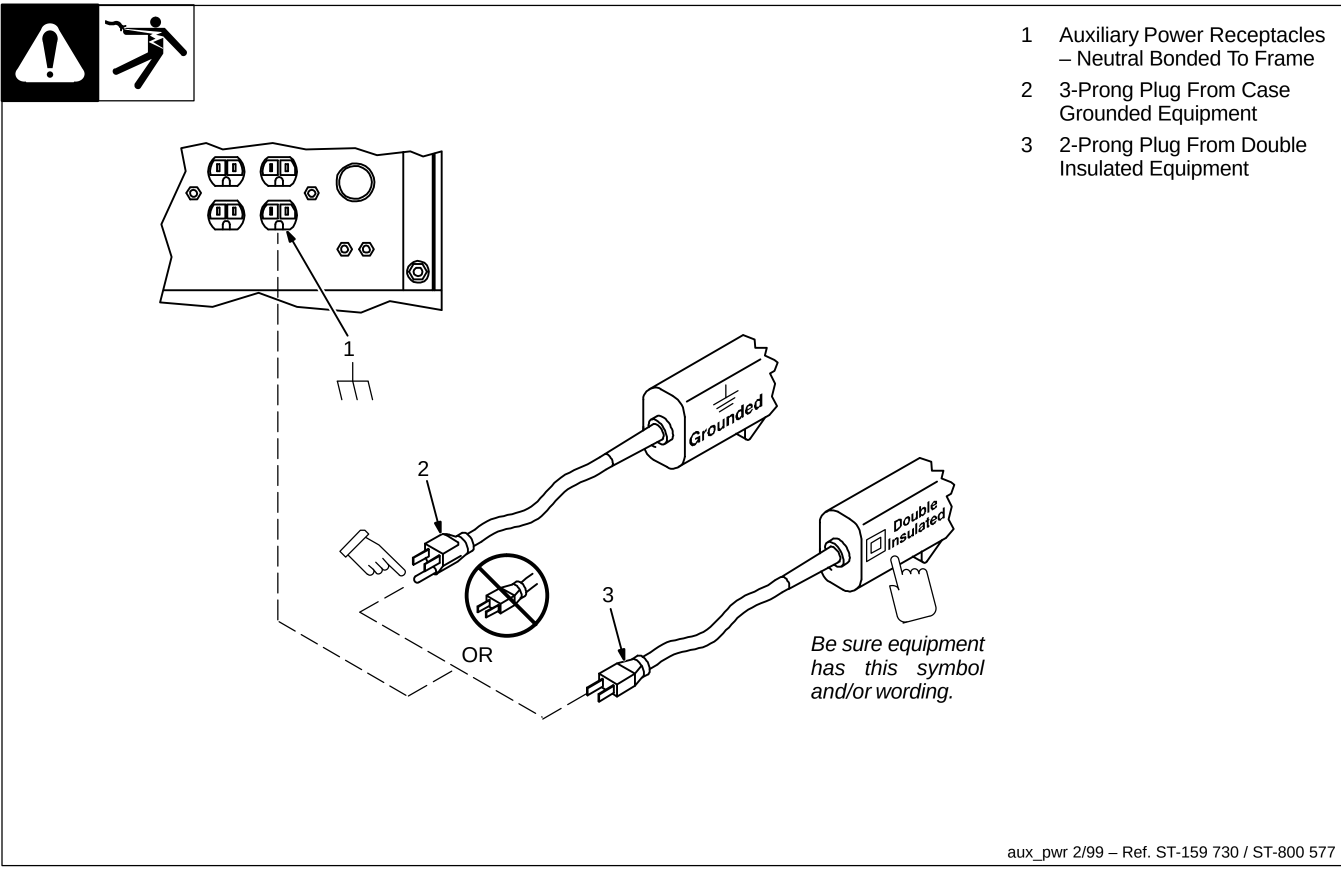



1--ELECTRODE POS.
2--AC
3--ELECTRODE NEG.

ST-190 578-B

# SECTION 9 – AUXILIARY POWER GUIDELINES

## 9-1. Selecting Equipment

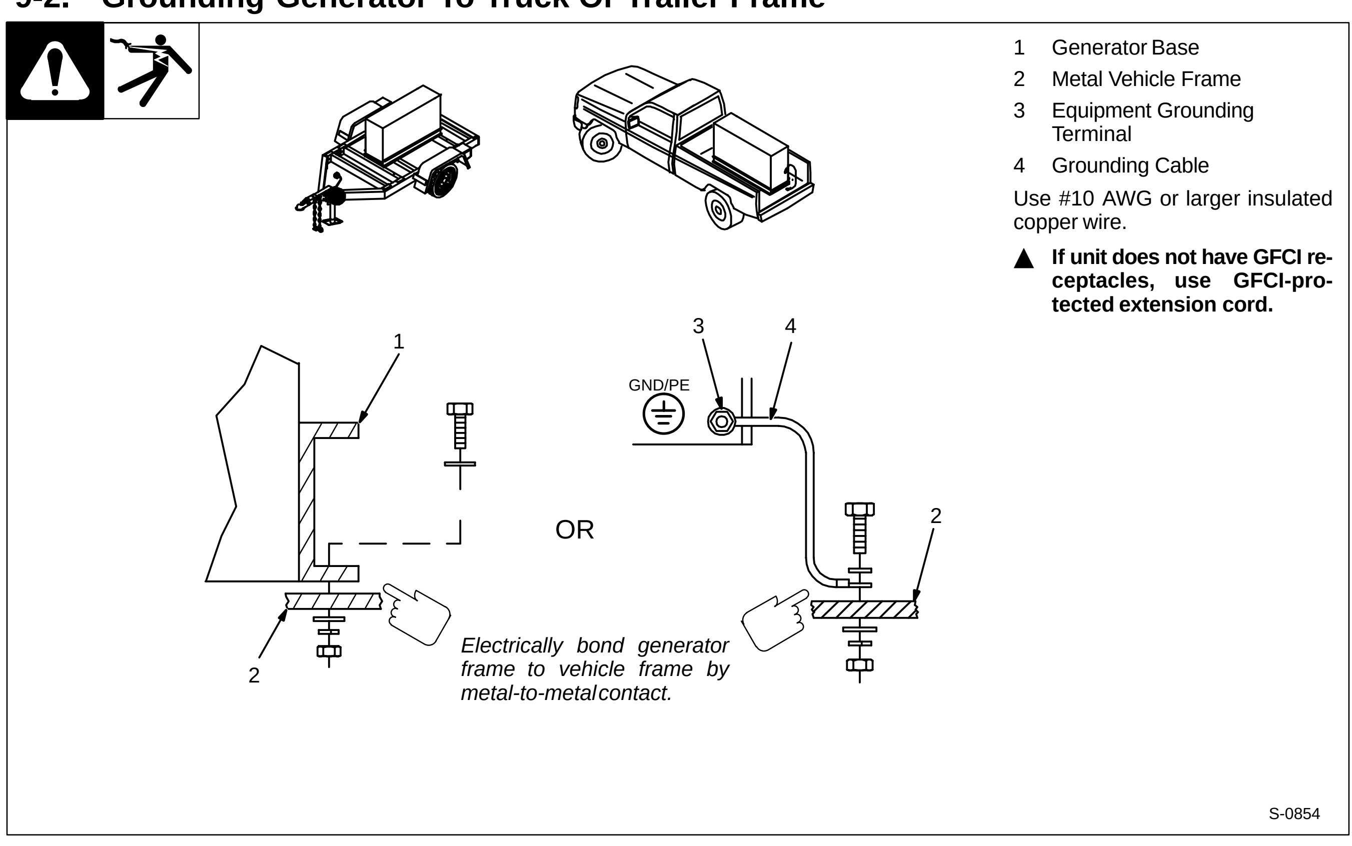



1 Auxiliary Power Receptacles – Neutral Bonded To Frame

2 3-Prong Plug From Case Grounded Equipment

3 2-Prong Plug From Double Insulated Equipment

## 9-2. Grounding Generator To Truck Or Trailer Frame




1 Generator Base

2 Metal Vehicle Frame

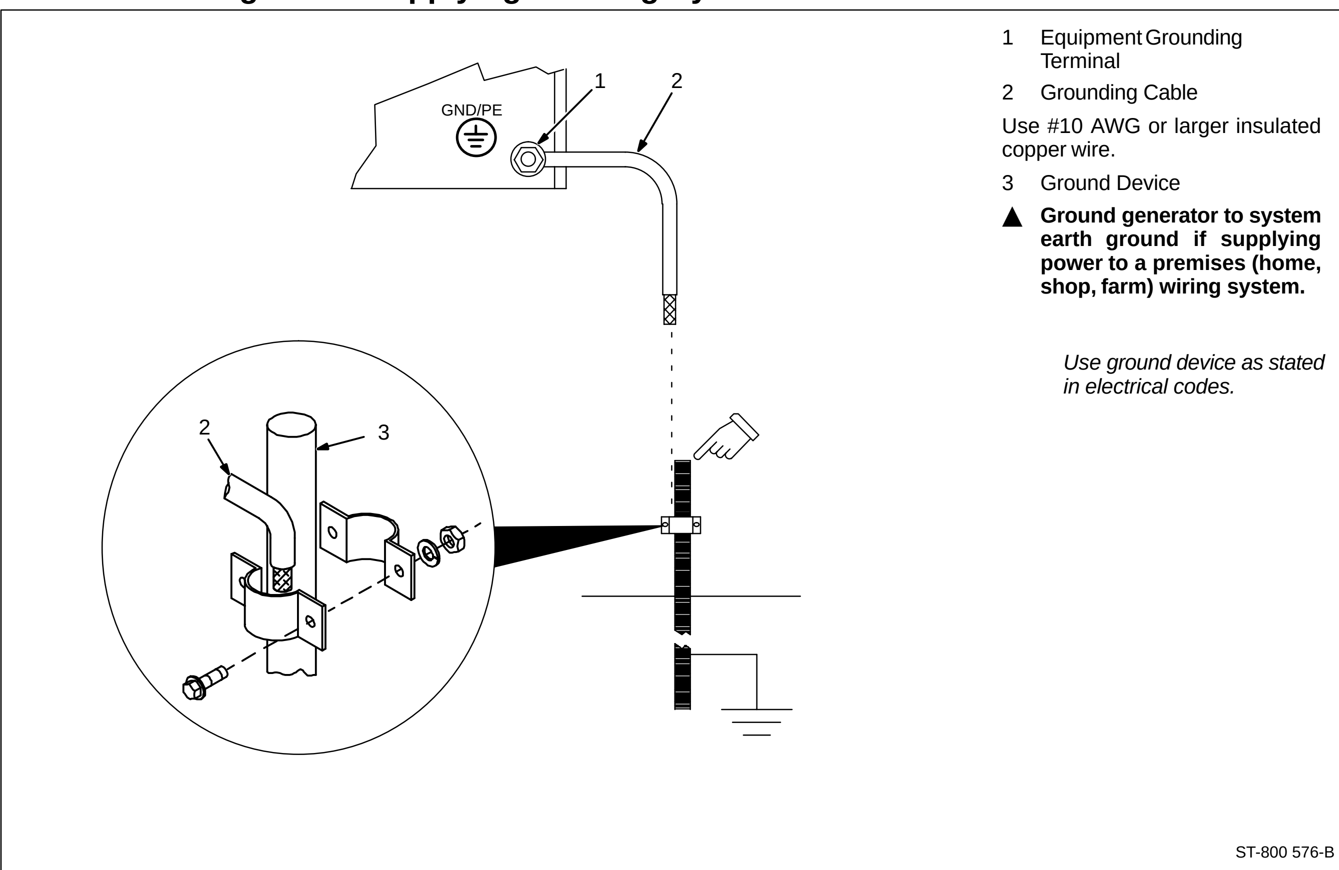
3 Equipment Grounding Terminal

4 Grounding Cable

Use #10 AWG or larger insulated copper wire.

▲ **If unit does not have GFCI receptacles, use GFCI-protected extension cord.**

## 9-3. Grounding When Supplying Building Systems




1 Equipment Grounding Terminal

2 Grounding Cable

Use #10 AWG or larger insulated copper wire.

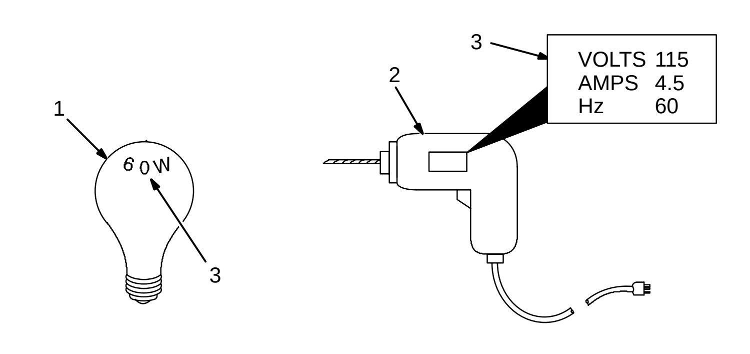
3 Ground Device

▲ **Ground generator to system earth ground if supplying power to a premises (home, shop, farm) wiring system.**

*Use ground device as stated in electrical codes.*

ST-800 576-B

## 9-4. How Much Power Does Equipment Require?




1 Resistive Load

A light bulb is a resistive load and requires a constant amount of power.

2 Non-Resistive Load

Equipment with a motor is a non-resistive load and requires approximately six times more power while starting the motor than when running (see Section 9-8).

3 Rating Data

Rating shows volts and amperes, or watts required to run equipment.

**AMPERES x VOLTS = WATTS**

**EXAMPLE 1:** If a drill uses 4.5 amperes at 115 volts, calculate its running power requirement in watts.

4.5 A x 115 V = 520 W

The load applied by the drill is 520 watts.

**EXAMPLE 2:** If three 200 watt flood lamps are used with the drill from Example 1, add the individual loads to calculate total load.

(200 W + 200 W + 200 W) + 520 W = 1120 W

The total load applied by the three flood lamps and drill is 1120 watts.

S-0623

## 9-5. Approximate Power Requirements For Industrial Motors

| Industrial Motors | Rating | Starting Watts | Running Watts |
|---|---|---|---|
| Split Phase | 1/8 HP | 800 | 300 |
| | 1/6 HP | 1225 | 500 |
| | 1/4 HP | 1600 | 600 |
| | 1/3 HP | 2100 | 700 |
| | 1/2 HP | 3175 | 875 |
| Capacitor Start-Induction Run | 1/3 HP | 2020 | 720 |
| | 1/2 HP | 3075 | 975 |
| | 3/4 HP | 4500 | 1400 |
| | 1 HP | 6100 | 1600 |
| | 1-1/2 HP | 8200 | 2200 |
| | 2 HP | 10550 | 2850 |
| | 3 HP | 15900 | 3900 |
| | 5 HP | 23300 | 6800 |
| Capacitor Start-Capacitor Run | 1-1/2 HP | 8100 | 2000 |
| | 5 HP | 23300 | 6000 |
| | 7-1/2 HP | 35000 | 8000 |
| | 10 HP | 46700 | 10700 |
| Fan Duty | 1/8 HP | 1000 | 400 |
| | 1/6 HP | 1400 | 550 |
| | 1/4 HP | 1850 | 650 |
| | 1/3 HP | 2400 | 800 |
| | 1/2 HP | 3500 | 1100 |

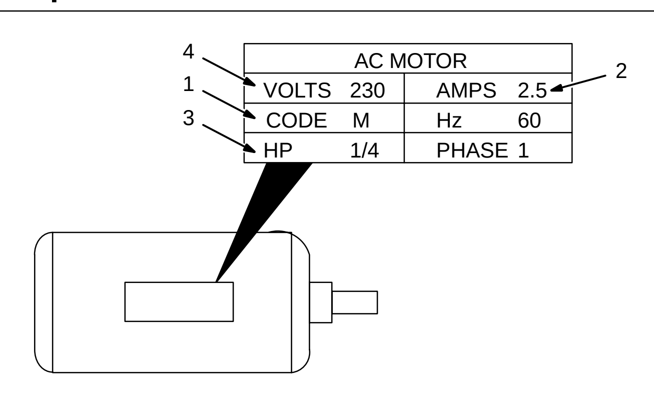
## 9-6. Approximate Power Requirements For Farm/Home Equipment

| Farm/Home Equipment | Rating | Starting Watts | Running Watts |
|---|---|---|---|
| Stock Tank De-Icer | | 1000 | 1000 |
| Grain Cleaner | 1/4 HP | 1650 | 650 |
| Portable Conveyor | 1/2 HP | 3400 | 1000 |
| Grain Elevator | 3/4 HP | 4400 | 1400 |
| Milk Cooler | | 2900 | 1100 |
| Milker (Vacuum Pump) | 2 HP | 10500 | 2800 |
| FARM DUTY MOTORS | 1/3 HP | 1720 | 720 |
| Std. (e.g. Conveyors, | 1/2 HP | 2575 | 975 |
| Feed Augers, Air | 3/4 HP | 4500 | 1400 |
| Compressors) | 1 HP | 6100 | 1600 |
| | 1-1/2 HP | 8200 | 2200 |
| | 2 HP | 10550 | 2850 |
| | 3 HP | 15900 | 3900 |
| | 5 HP | 23300 | 6800 |
| High Torque (e.g. Barn | 1-1/2 HP | 8100 | 2000 |
| Cleaners, Silo Unloaders, | 5 HP | 23300 | 6000 |
| Silo Hoists, Bunk Feeders) | 7-1/2 HP | 35000 | 8000 |
| | 10 HP | 46700 | 10700 |
| 3-1/2 cu. ft. Mixer | 1/2 HP | 3300 | 1000 |
| High Pressure 1.8 Gal/Min | 500 PSI | 3150 | 950 |
| Washer 2 gal/min | 550 PSI | 4500 | 1400 |
| 2 gal/min | 700 PSI | 6100 | 1600 |
| Refrigerator or Freezer | | 3100 | 800 |
| Shallow Well Pump | 1/3 HP | 2150 | 750 |
| | 1/2 HP | 3100 | 1000 |
| Sump Pump | 1/3 HP | 2100 | 800 |
| | 1/2 HP | 3200 | 1050 |

## 9-7. Approximate Power Requirements For Contractor Equipment

| Contractor | Rating | Starting Watts | Running Watts |
|---|---|---|---|
| Hand Drill | 1/4 in | 350 | 350 |
| | 3/8 in | 400 | 400 |
| | 1/2 in | 600 | 600 |
| Circular Saw | 6-1/2 in | 500 | 500 |
| | 7-1/4 in | 900 | 900 |
| | 8-1/4 in | 1400 | 1400 |
| Table Saw | 9 in | 4500 | 1500 |
| | 10 in | 6300 | 1800 |
| Band Saw | 14 in | 2500 | 1100 |
| Bench Grinder | 6 in | 1720 | 720 |
| | 8 in | 3900 | 1400 |
| | 10 in | 5200 | 1600 |
| Air Compressor | 1/2 HP | 3000 | 1000 |
| | 1 HP | 6000 | 1500 |
| | 1-1/2 HP | 8200 | 2200 |
| | 2 HP | 10500 | 2800 |
| Electric Chain Saw | 1-1/2 HP, 12 in | 1100 | 1100 |
| | 2 HP, 14 in | 1100 | 1100 |
| Electric Trimmer | Standard 9 in | 350 | 350 |
| | Heavy Duty 12 in | 500 | 500 |
| Electric Cultivator | 1/3 HP | 2100 | 700 |
| Elec. Hedge Trimmer | 18 in | 400 | 400 |
| Flood Lights | HID | 125 | 100 |
| | Metal Halide | 313 | 250 |
| | Mercury | 1000 | |
| | Sodium | 1400 | |
| | Vapor | 1250 | 1000 |
| Submersible Pump | 400 gph | 600 | 200 |
| Centrifugal Pump | 900 gph | 900 | 500 |
| Floor Polisher | 3/4 HP, 16 in | 4500 | 1400 |
| | 1 HP, 20 in | 6100 | 1600 |
| High Pressure Washer | 1/2 HP | 3150 | 950 |
| | 3/4 HP | 4500 | 1400 |
| | 1 HP | 6100 | 1600 |
| 55 gal Drum Mixer | 1/4 HP | 1900 | 700 |
| Wet & Dry Vac | 1.7 HP | 900 | 900 |
| | 2-1/2 HP | 1300 | 1300 |

## 9-8. Power Required To Start Motor




1 Motor Start Code
2 Running Amperage
3 Motor HP
4 Motor Voltage

To find starting amperage:

**Step 1:** Find code and use table to find kVA/HP. If code is not listed, multiply running amperage by six to find starting amperage.

**Step 2**: Find Motor HP and Volts.

**Step 3:** Determine starting amperage (see example).

Welding generator amperage output must be at least twice the motor's running amperage.

**Single-Phase Induction Motor Starting Requirements**

| Motor Start Code | G | H | J | K | L | M | N | P |
|---|---|---|---|---|---|---|---|---|
| KVA/HP | 6.3 | 7.1 | 8.0 | 9.0 | 10.0 | 11.2 | 12.5 | 14.0 |

$$\frac{\text{kVA/HP} \times \text{HP} \times 1000}{\text{VOLTS}} = \text{STARTING AMPERAGE}$$

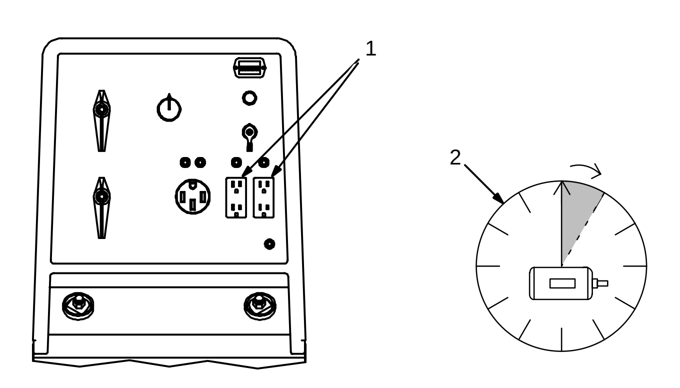
**EXAMPLE:** Calculate the starting amperage required for a 230 V, 1/4 HP motor with a motor start code of M.

Volts = 230 HP = 1/4 Using Table, Code M results in kVA/HP = 11.2

$$\frac{11.2 \times 1/4 \times 1000}{230} = 12.2\ \text{A}$$ **Starting the motor requires 12.2 amperes.**

S-0624

## 9-9. How Much Power Can Generator Supply?




1 Limit Load To 90% Of Generator Output

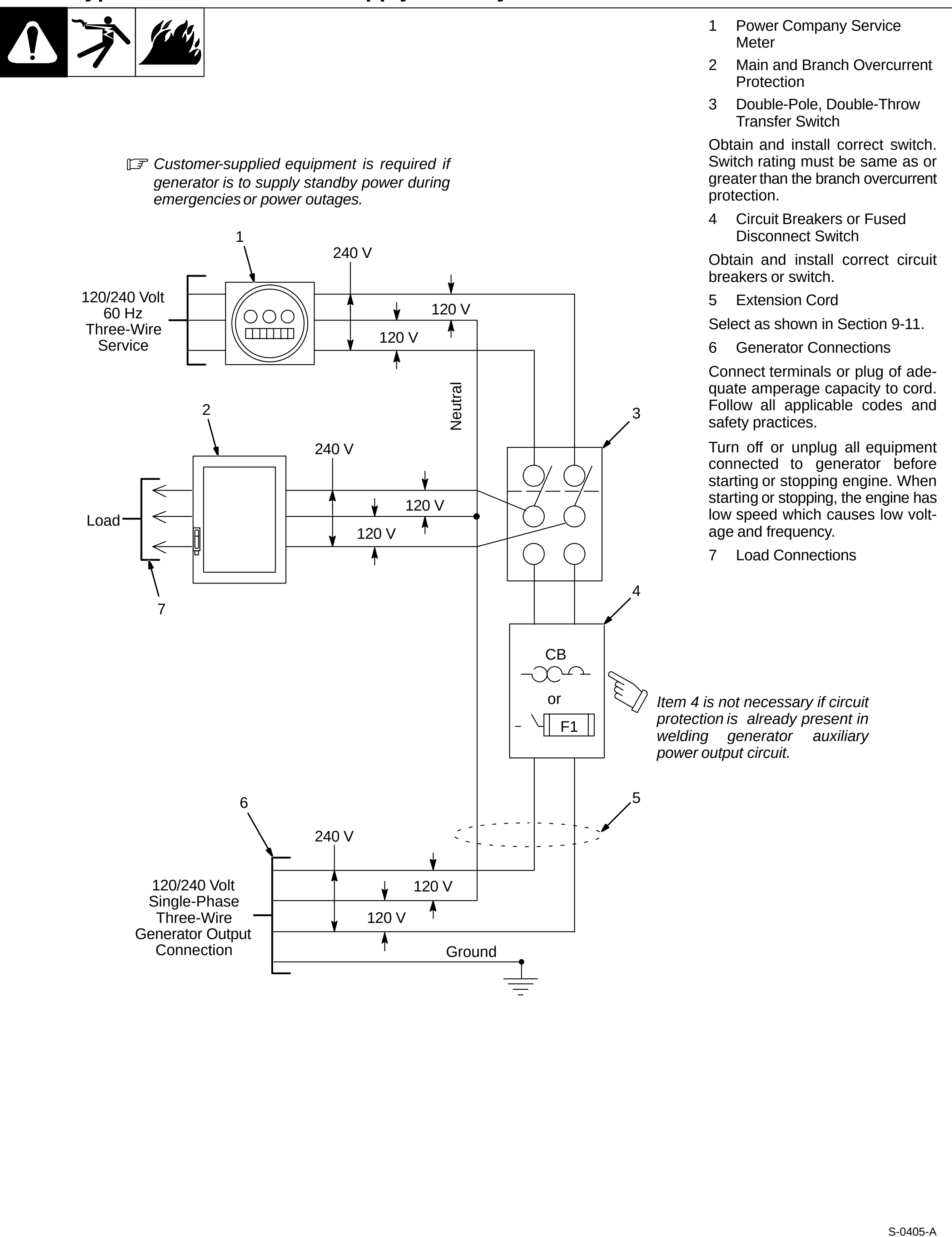
Always start non-resistive (motor) loads in order from largest to smallest, and add resistive loads last.

2 5 Second Rule

If motor does not start within 5 seconds, turn off power to prevent motor damage. Motor requires more power than generator can supply.

Ref. ST-800 396-A / S-0625

## 9-10. Typical Connections To Supply Standby Power




1 Power Company Service Meter

2 Main and Branch Overcurrent Protection

3 Double-Pole, Double-Throw Transfer Switch

Obtain and install correct switch. Switch rating must be same as or greater than the branch overcurrent protection.

4 Circuit Breakers or Fused Disconnect Switch

Obtain and install correct circuit breakers or switch.

5 Extension Cord

Select as shown in Section 9-11.

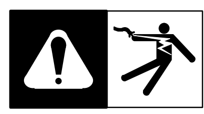
6 Generator Connections

Connect terminals or plug of adequate amperage capacity to cord. Follow all applicable codes and safety practices.

Turn off or unplug all equipment connected to generator before starting or stopping engine. When starting or stopping, the engine has low speed which causes low voltage and frequency.

7 Load Connections

## 9-11. Selecting Extension Cord (Use Shortest Cord Possible)



**Cord Lengths for 120 Volt Loads**

▲ **If unit does not have GFCI receptacles, use GFCI-protected extension cord.**

| Current (Amperes) | Load (Watts) | Maximum Allowable Cord Length in ft (m) for Conductor Size (AWG)* | | | | | |
|---|---|---|---|---|---|---|---|
| | | 4 | 6 | 8 | 10 | 12 | 14 |
| 5 | 600 | | | 350 (106) | 225 (68) | 137 (42) | 100 (30) |
| 7 | 840 | | 400 (122) | 250 (76) | 150 (46) | 100 (30) | 62 (19) |
| 10 | 1200 | 400 (122) | 275 (84) | 175 (53) | 112 (34) | 62 (19) | 50 (15) |
| 15 | 1800 | 300 (91) | 175 (53) | 112 (34) | 75 (23) | 37 (11) | 30 (9) |
| 20 | 2400 | 225 (68) | 137 (42) | 87 (26) | 50 (15) | 30 (9) | |
| 25 | 3000 | 175 (53) | 112 (34) | 62 (19) | 37 (11) | | |
| 30 | 3600 | 150 (46) | 87 (26) | 50 (15) | 37 (11) | | |
| 35 | 4200 | 125 (38) | 75 (23) | 50 (15) | | | |
| 40 | 4800 | 112 (34) | 62 (19) | 37 (11) | | | |
| 45 | 5400 | 100 (30) | 62 (19) | | | | |
| 50 | 6000 | 87 (26) | 50 (15) | | | | |

*Conductor size is based on maximum 2% voltage drop

**Cord Lengths for 240 Volt Loads**

▲ **If unit does not have GFCI receptacles, use GFCI-protected extension cord.**

| Current (Amperes) | Load (Watts) | Maximum Allowable Cord Length in ft (m) for Conductor Size (AWG)* | | | | | |
|---|---|---|---|---|---|---|---|
| | | 4 | 6 | 8 | 10 | 12 | 14 |
| 5 | 1200 | | | 700 (213) | 450 (137) | 225 (84) | 200 (61) |
| 7 | 1680 | | 800 (244) | 500 (152) | 300 (91) | 200 (61) | 125 (38) |
| 10 | 2400 | 800 (244) | 550 (168) | 350 (107) | 225 (69) | 125 (38) | 100 (31) |
| 15 | 3600 | 600 (183) | 350 (107) | 225 (69) | 150 (46) | 75 (23) | 60 (18) |
| 20 | 4800 | 450 (137) | 275 (84) | 175 (53) | 100 (31) | 60 (18) | |
| 25 | 6000 | 350 (107) | 225 (69) | 125 (38) | 75 (23) | | |
| 30 | 7000 | 300 (91) | 175 (53) | 100 (31) | 75 (23) | | |
| 35 | 8400 | 250 (76) | 150 (46) | 100 (31) | | | |
| 40 | 9600 | 225 (69) | 125 (38) | 75 (23) | | | |
| 45 | 10,800 | 200 (61) | 125 (38) | | | | |
| 50 | 12,000 | 175 (53) | 100 (31) | | | | |

*Conductor size is based on maximum 2% voltage drop

# SECTION 10 – PARTS LIST

☞ *Hardware is common and not available unless listed.*

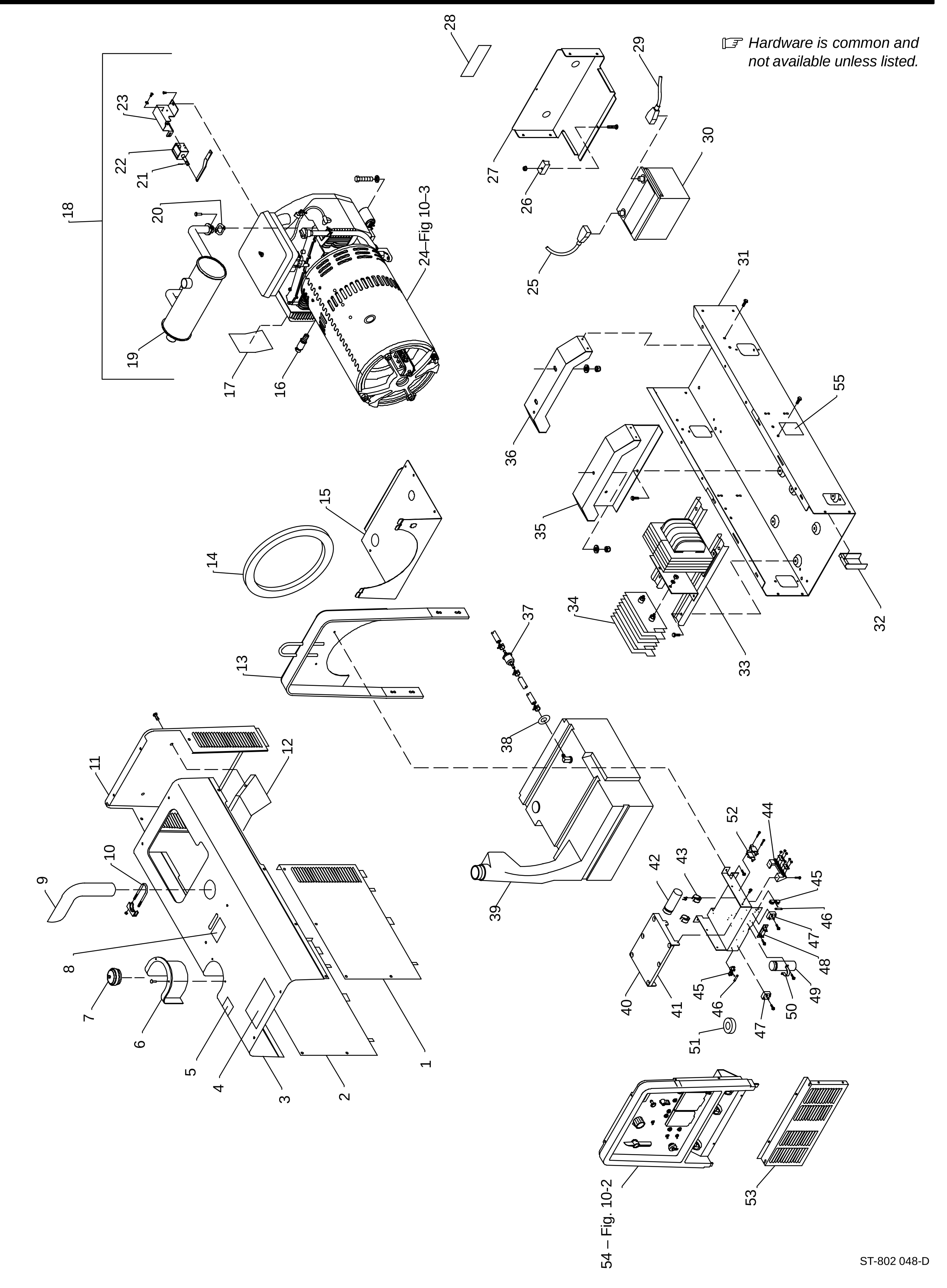



Figure 10-1. Main Assembly

| Item No. | Dia. Mkgs. | Part No. | Description | Quantity |
| --- | --- | --- | --- | --- |

**Figure 10-1. Main Assembly**

| Item No. | Dia. Mkgs. | Part No. | Description | Quantity |
| --- | --- | --- | --- | --- |
| 1 | | 182 367 | PANEL, right side | 1 |
| 1 | | ♦185 352 | PANEL, right side stainless | 1 |
| 2 | | 182 366 | PANEL, left side | 1 |
| 2 | | ♦185 353 | PANEL, left side stainless | 1 |
| 3 | | +183 221 | COVER, top | 1 |
| 3 | | +♦185 354 | COVER, top stainless | 1 |
| 4 | | 182 761 | LABEL, general precautionary engine drive | 1 |
| 5 | | 192 042 | LABEL, warning engine fuel | 1 |
| 6 | | 181 881 | GROMMET, neck filler | 1 |
| 7 | | 147 601 | CAP, tank screw-on | 1 |
| 8 | | 108 487 | LABEL, warning falling equipment etc | 1 |
| 9 | | 183 433 | PIPE, exhaust elbow | 1 |
| 10 | | 183 314 | CLAMP, muffler 1.625 dia. | 1 |
| 11 | | 182 365 | PANEL, rear upper | 1 |
| 11 | | ♦185 351 | PANEL, rear upper stainless | 1 |
| 12 | | 183 626 | BAFFLE, air | 1 |
| | | 185 323 | SEAL, baffle engine air | 2 |
| | | 010 493 | BUSHING, snap-in nylon | 1 |
| 13 | | 159 914 | UPRIGHT, base | 1 |
| 14 | | 164 928 | SEAL, barrel | 1 |
| 15 | | 183 166 | PANEL, rear lower | 1 |
| 16 | | 165 271 | VALVE, oil drain 3/8-18NPTF (included with engine) | 1 |
| 17 | | 165 623 | LABEL, engine maintenance | 1 |
| 18 | | 187 126 | ENGINE, gas (consisting of) | 1 |
| 19 | | 183 434 | .. MUFFLER, exhaust engine | 1 |
| 20 | | 065 313 | .. GASKET, muffler | 1 |
| 21 | | 059 926 | .. PIN, spring CS .093 x 1.000 | 1 |
| 22 | TS1 | 165 810 | .. SOLENOID, 14VDC .53A | 1 |
| 23 | | 165 522 | .. BRACKET, mtg solenoid | 1 |
| | | 192 868 | .. INDICATOR/CAP ASSEMBLY (Dipstick) | 1 |
| | | 192 869 | .. ADAPTER ASSEMBLY (1 in. collar on oil fill tube) | 1 |
| | | ♦192 093 | PUMP, electric fuel | 1 |
| | PLG5 | | CONNECTOR, (Part of engine harness) | 1 |
| | RC5 | 116 045 | CONNECTOR & PINS | 1 |
| | PLG7, RC7 | | CONNECTOR, (Part of engine harness) | 1 |
| | PLG10 | 174 823 | CONNECTOR & SOCKETS | 1 |
| | RC10 | 174 824 | CONNECTOR & PINS | 1 |
| 24 | | Fig 10-3 | GENERATOR | 1 |
| 25 | | 167 730 | CABLE, battery neg 29.00 lg | 1 |
| | | 165 600 | CABLE, battery neg 18.50 lg | 1 |
| 26 | | 182 935 | HOLD DOWN, battery | 1 |
| 27 | | +182 897 | DOOR, access bat | 1 |
| 28 | | 168 385 | LABEL, warning battery explosion can blind | 1 |
| 29 | | 167 731 | CABLE, bat pos 19.500 lg (included w/engine) | 1 |
| 30 | Batt | 167 677 | BATTERY, stor 12V 450crk 75rsv GP58 | 1 |
| 31 | | +182 845 | BASE | 1 |
| 32 | | 181 057 | COVER, base | 4 |
| 33 | DC-Z | 187 018 | STABILIZER ASSEMBLY, (consisting of) | 1 |
| | | 187 020 | .. STABILIZER | 1 |
| | | 180 625 | .. BRACKET, mtg rectifier | 1 |
| | | 164 920 | .. BRACKET, mtg stab/reactor | 2 |
| 34 | SR1 | 183 051 | RECTIFIER, si 3ph 300A | 1 |
| 35 | | 182 928 | BRACKET, mtg generator | 1 |
| 36 | | 159 905 | BRACKET, mtg engine | 1 |
| 37 | | 121 652 | FILTER KIT, fuel w/clamps | 1 |
| 38 | | 174 001 | SEAL, fuel hose fitting | 1 |
| 39 | | 182 079 | TANK, fuel 10 gal (consisting of) | 1 |
| | | 124 253 | .. BUSHING, tank fuel | 1 |
| | | 187 502 | .. FITTING, stand pipe | 1 |
| | | 182 922 | .. BUSHING, fuel tank 1.210 ID | 1 |
| | | 182 925 | .. GAUGE, fuel | 1 |
| 40 | | 181 587 | TRAY, pc board | 1 |
| 41 | PC2 | 198 412 | CIRCUIT CARD ASSEMBLY. field current controller | 1 |

| Item No. | Dia. Mkgs. | Part No. | Description | Quantity |
|---|---|---|---|---|

**Figure 10-1. Main Assembly (Continued)**

| Item No. | Dia. Mkgs. | Part No. | Description | Quantity |
|---|---|---|---|---|
| | RC1 | 174 824 | CONNECTOR & PINS | 1 |
| | PLG1 | 174 823 | CONNECTOR & SOCKETS | 1 |
| | PLG3 | 135 275 | CONNECTOR & SOCKETS | 1 |
| | PLG6 | 174 823 | CONNECTOR & SOCKETS | 1 |
| | RC6 | 174 824 | CONNECTOR & PINS | 1 |
| | PLG9 | 168 071 | CONNECTOR & SOCKETS | 1 |
| 42 | C52 | 176 007 | CAPACITOR, slectl 1200uf 300VDC | 1 |
| 43 | | 176 199 | CLAMP, capacitor | 2 |
| 44 | 1T | 172 661 | BLOCK, stud connection 6posn (consisting of) | 1 |
| | | 173 734 | JUMPER LINK | 2 |
| 45 | | 172 731 | HOLDER, fuse mintr | 2 |
| 46 | F1, F2 | *169 296 | FUSE, mintr gls 25A 125V | 2 |
| 47 | SR2,3 | 035 704 | RECTIFIER, integ 40A 800V | 2 |
| 48 | D2 | 135 184 | DIODE, board | 1 |
| 49 | C1 | 176 719 | CAPACITOR, electl 1000uf 75VDC | 1 |
| 50 | | 177 136 | CLAMP, capacitor | 1 |
| 51 | CT1 | 187 144 | TRANSFORMER, current sensing | 1 |
| 52 | R4,5 | 139 812 | RESISTOR, WW fxd 30W 5K | 2 |
| 53 | | 180 628 | PANEL, lower front | 1 |
| 54 | | Fig 10-2 | PANEL, front w/components | 1 |
| 55 | | 197 930 | LABEL, warning do not weld on base | 2 |
| | F6 | *021 718 | FUSE, mintr gl 30A 32V | 1 |
| | | 137 046 | TUNE-UP & FILTER KIT, (consisting of) | 1 |
| | | 064 617 | ELEMENT, air cleaner | 1 |
| | | 065 251 | OIL FILTER | 1 |
| | | 121 652 | FILTER/CLAMPS, fuel | 1 |
| | | 065 709 | SPARK PLUG | 2 |

♦Optional *Recommended Spare Parts.

+When ordering a component originally displaying a precautionary label, the label should also be ordered.

**To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.**

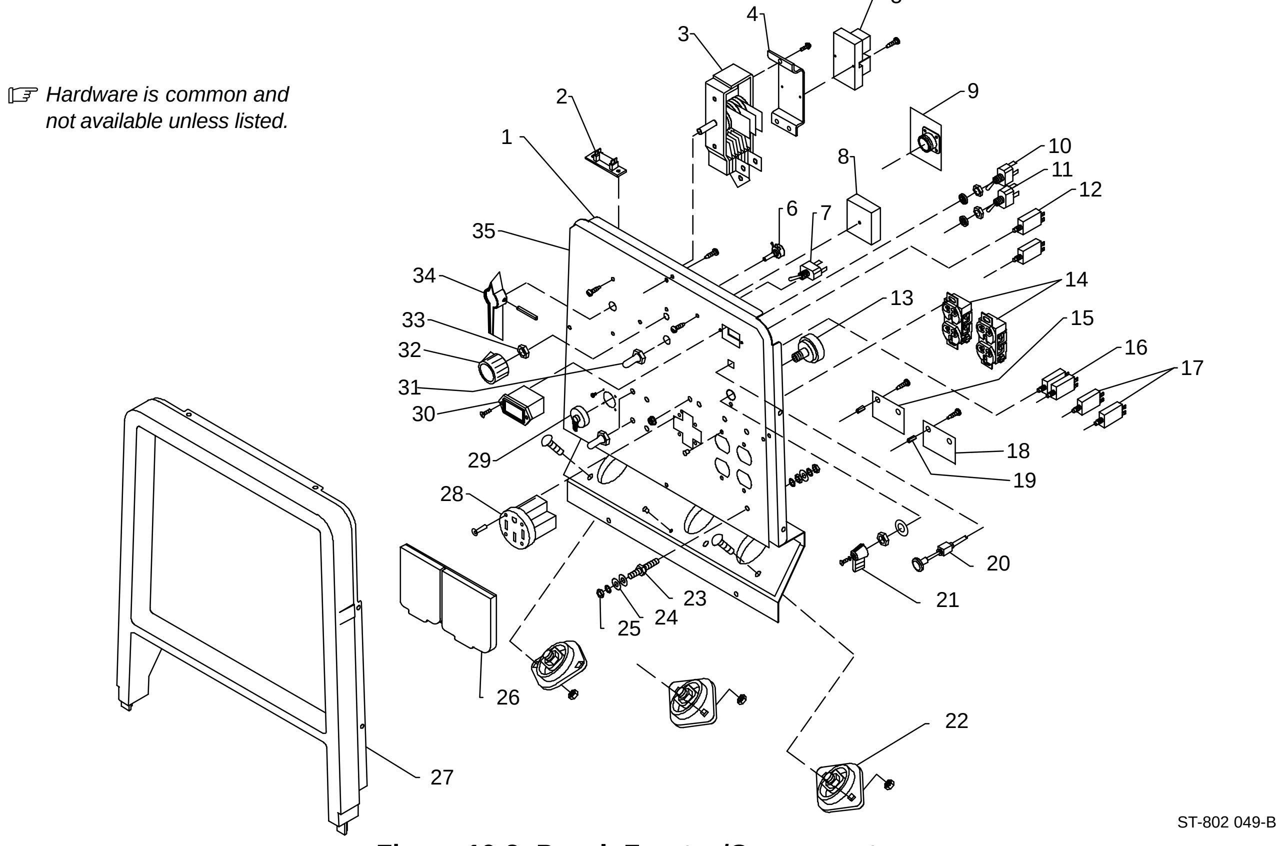



**Figure 10-2. Panel, Front w/Components**

| Item No. | Dia. Mkgs. | Part No. | Description | Quantity |
|---|---|---|---|---|

**Figure 10-2. Panel, Front w/Components (Fig 10-1 Item 54)**

| Item No. | Dia. Mkgs. | Part No. | Description | Quantity |
|---|---|---|---|---|
| 1 | | 187 593 | PANEL, front | 1 |
| 2 | R3,VR1 | 046 819 | SUPPRESSOR | 1 |
| 3 | S1 | 187 190 | SWITCH, changeover | 1 |
| 4 | | 187 189 | BRACKET, shunt mtg | 1 |
| 5 | | 030 080 | SHUNT, meter 50MV 400A | 1 |
| 6 | R1 | 072 623 | POTENTIOMETER | 1 |
| 7 | S6 | 088 409 | SWITCH, toggle DPDT 15A 125VAC | 1 |
| 8 | PC1 | 184 731 | MODULE, pull to idle 4 pin | 1 |
| 9 | PC4 | 147 554 | CIRCUIT CARD ASSEMBLY, connector/receptacle | 1 |
| 10 | S4 | 011 609 | SWITCH, tgl SPDT 15A 125V | 1 |
| 11 | S3 | 011 611 | SWITCH, tgl DPDT 15A 125V | 1 |
| 12 | CB5,6 | 083 432 | CIRCUIT BREAKER, man reset 1P 10A 250V | 2 |
| 13 | S2 | 176 606 | SWITCH, ign 4posn | 1 |
| | PLG8 | 177 859 | CONNECTOR | 1 |
| 14 | RC2,3 | 141 432 | RECEPTACLE, str dx grd 2P3W 20A 125VAC | 2 |
| | GFCI2,3 | ♦147 939 | RECEPTACLE, str dx grd 2P3W 15A 125VAC GFCI | 2 |
| 15 | PC3 | 148 021 | CIRCUIT CARD, filter HF | 1 |
| 16 | CB1,2 | 117 501 | CIRCUIT BREAKER, man reset 1P 40A 250V | 2 |
| 17 | CB3,4 | 093 996 | CIRCUIT BREAKER, man reset 1P 20A 250V | 4 |
| 18 | PC5 | 148 030 | CIRCUIT CARD, filter HF | 1 |
| 19 | | 073 756 | STAND OFF, 6-32 x .625 lg | 4 |
| 20 | | 182 870 | CONTROL, push pull | 1 |
| 21 | | 119 014 | LEVER, switch black | 1 |
| 22 | | 099 255 | TERMINAL, pwr output | 3 |
| 23 | | 083 030 | STUD, brs .250-20 x 1.750 | 1 |
| 24 | | 010 915 | WASHER, flat brs .250 | 2 |
| 25 | | 601 836 | NUT, brs hex jam .250-20 | 3 |
| 26 | | 188 039 | COVER, receptacle with gasket | 1 |
| 27 | | 159 921 | BEZEL | 1 |
| 28 | RC1 | 182 954 | RECEPTACLE, str 3P4W 50A 125/250VAC | 1 |
| | | 119 172 | PLUG, st 50A 125/250V | 1 |
| 29 | | 170 391 | CAP, dust connector 9760-20 protector | 1 |
| 30 | HM | 145 247 | METER, hour 10-32VDC | 1 |
| 31 | | 021 385 | BOOT, toggle switch lever | 3 |
| 32 | | 097 924 | KNOB, pointer | 1 |
| 33 | | 072 590 | LOCK, shaft .375-32 x .250dia shaft | 1 |
| 34 | | 115 493 | HANDLE, range switch | 1 |
| 35 | | | NAMEPLATE, (order by model and serial number) | 1 |

♦Optional

**To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.**

| Item No. | Part No. | Description | Quantity |
|---|---|---|---|

**Figure 10-3. Generator (Fig 10-1 Item 24)**

| | | | |
|---|---|---|---|
| 1 | +186 238 | STATOR | 1 |
| 2 | 013 367 | LABEL, warning moving parts can cause serious injury | 1 |
| 3 | 186 239 | ROTOR ASSEMBLY, (consisting of) | 1 |
| 4 | 181 143 | BEARING, ball | 1 |
| 5 | 107 417 | FAN, rotor | 1 |
| 6 | 134 981 | ADAPTER, fan rotor | 1 |
| 7 | 160 567 | ADAPTER, engine | 1 |
| 8 | 187 151 | STUD, stl .375 -16 x 23.750 | 4 |
| 9 | 047 878 | BAR, retaining brushholder | 1 |
| 10 | 161 306 | CAP, brushholder | 3 |
| 11 | *126 984 | BRUSH, w/spring | 3 |
| 12 | 005 614 | HOLDER, brush | 3 |
| 13 | 187 183 | BRACKET, mtg brushholder | 1 |
| 14 | 187 536 | ENDBELL, (consisting of) | 1 |
| 15 | 183 419 | O-RING, 1.984 ID x .139CS | 1 |

☞ *Hardware is common and not available unless listed.*

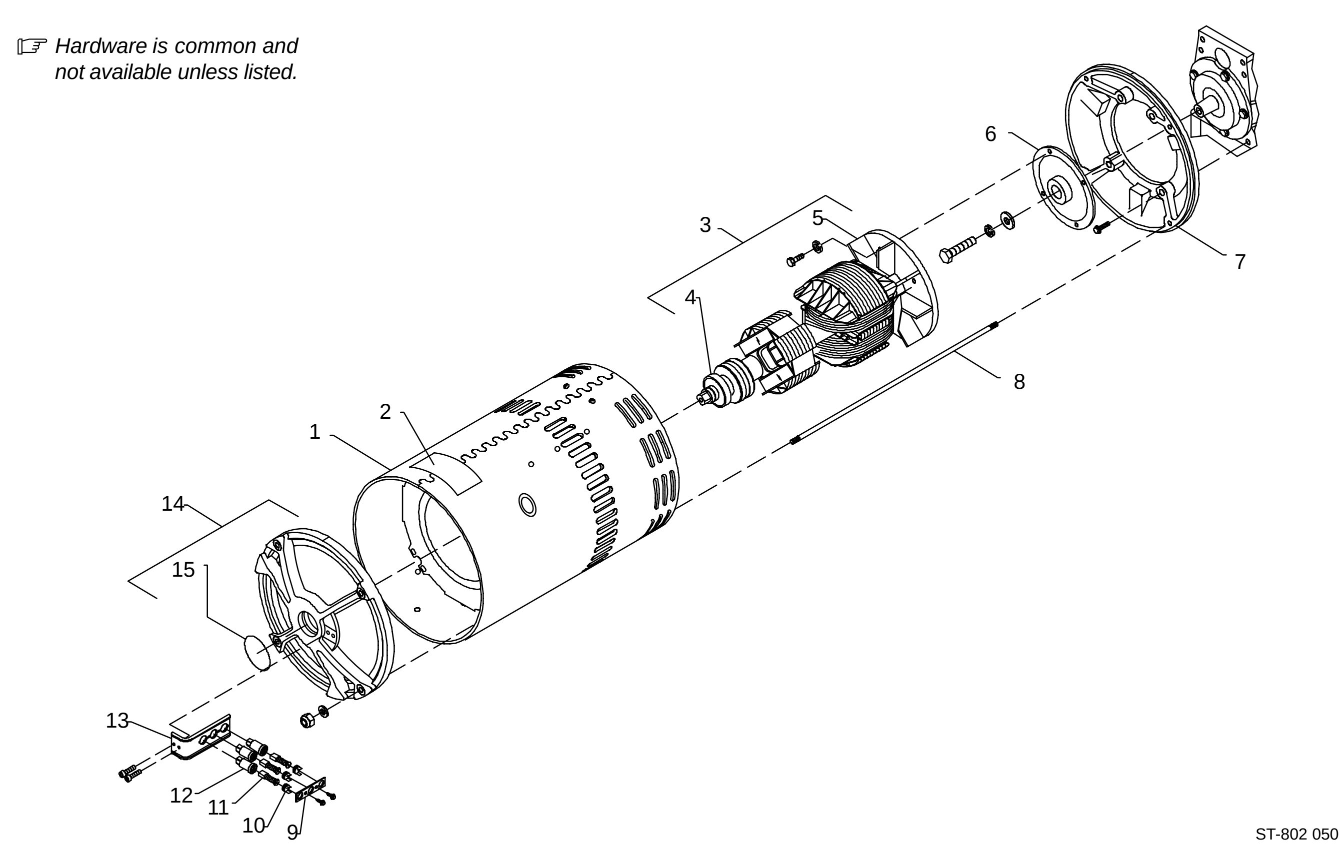



**Figure 10-3. Generator**

+When ordering a component originally displaying a precautionary label, the label should also be ordered.
*Recommended Spare Parts.

**To maintain the factory original performance of your equipment, use only Manufacturer’s Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.**




Effective January 1, 2000
(Equipment with a serial number preface of “LA” or newer)

This limited warranty supersedes all previous Miller warranties and is exclusive with no other guarantees or warranties expressed or implied.

*Warranty Questions?*

Call
1-800-4-A-MILLER
for your local
Miller distributor.

Your distributor also gives you ...

**Service**
You always get the fast, reliable response you need. Most replacement parts can be in your hands in 24 hours.

**Support**
Need fast answers to the tough welding questions? Contact your distributor. The expertise of the distributor and Miller is there to help you, every step of the way.

LIMITED WARRANTY – Subject to the terms and conditions below, Miller Electric Mfg. Co., Appleton, Wisconsin, warrants to its original retail purchaser that new Miller equipment sold after the effective date of this limited warranty is free of defects in material and workmanship at the time it is shipped by Miller. THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS.

Within the warranty periods listed below, Miller will repair or replace any warranted parts or components that fail due to such defects in material or workmanship. Miller must be notified in writing within thirty (30) days of such defect or failure, at which time Miller will provide instructions on the warranty claim procedures to be followed.

Miller shall honor warranty claims on warranted equipment listed below in the event of such a failure within the warranty time periods. All warranty time periods start on the date that the equipment was delivered to the original retail purchaser, or one year after the equipment is sent to a North American distributor or eighteen months after the equipment is sent to an International distributor.

1. 5 Years Parts – 3 Years Labor
   * Original main power rectifiers
   * Inverters (input and output rectifiers only)
2. 3 Years — Parts and Labor
   * Transformer/Rectifier Power Sources
   * Plasma Arc Cutting Power Sources
   * Semi-Automatic and Automatic Wire Feeders
   * Inverter Power Supplies
   * Intellitig
   * Engine Driven Welding Generators **(NOTE: Engines are warranted separately by the engine manufacturer.)**
3. 1 Year — Parts and Labor
   * DS-2 Wire Feeder
   * Motor Driven Guns (w/exception of Spoolmate 185 & Spoolmate 250)
   * Process Controllers
   * Positioners and Controllers
   * Automatic Motion Devices
   * RFCS Foot Controls
   * Induction Heating Power Sources
   * Water Coolant Systems
   * HF Units
   * Grids
   * Maxstar 140
   * Spot Welders
   * Load Banks
   * Miller Cyclomatic Equipment
   * Running Gear/Trailers
   * Plasma Cutting Torches (except APT & SAF Models)
   * Field Options (NOTE: Field options are covered under True Blue® for the remaining warranty period of the product they are installed in, or for a minimum of one year — whichever is greater.)
4. 6 Months — Batteries
5. 90 Days — Parts
   * MIG Guns/TIG Torches
   * Induction Heating Coils and Blankets
   * APT, ZIPCUT & PLAZCUT Model Plasma Cutting Torches
   * Remote Controls
   * Accessory Kits
   * Replacement Parts (No labor)
   * Spoolmate 185 & Spoolmate 250
   * Canvas Covers

Miller's True Blue® Limited Warranty shall not apply to:

1. **Consumable components; such as contact tips, cutting nozzles, contactors, brushes, slip rings, relays or parts that fail due to normal wear.**
2. Items furnished by Miller, but manufactured by others, such as engines or trade accessories. These items are covered by the manufacturer's warranty, if any.
3. Equipment that has been modified by any party other than Miller, or equipment that has been improperly installed, improperly operated or misused based upon industry standards, or equipment which has not had reasonable and necessary maintenance, or equipment which has been used for operation outside of the specifications for the equipment.

MILLER PRODUCTS ARE INTENDED FOR PURCHASE AND USE BY COMMERCIAL/INDUSTRIAL USERS AND PERSONS TRAINED AND EXPERIENCED IN THE USE AND MAINTENANCE OF WELDING EQUIPMENT.

In the event of a warranty claim covered by this warranty, the exclusive remedies shall be, at Miller's option: (1) repair; or (2) replacement; or, where authorized in writing by Miller in appropriate cases, (3) the reasonable cost of repair or replacement at an authorized Miller service station; or (4) payment of or credit for the purchase price (less reasonable depreciation based upon actual use) upon return of the goods at customer's risk and expense. Miller's option of repair or replacement will be F.O.B., Factory at Appleton, Wisconsin, or F.O.B. at a Miller authorized service facility as determined by Miller. Therefore no compensation or reimbursement for transportation costs of any kind will be allowed.

TO THE EXTENT PERMITTED BY LAW, THE REMEDIES PROVIDED HEREIN ARE THE SOLE AND EXCLUSIVE REMEDIES. IN NO EVENT SHALL MILLER BE LIABLE FOR DIRECT, INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES (INCLUDING LOSS OF PROFIT), WHETHER BASED ON CONTRACT, TORT OR ANY OTHER LEGAL THEORY.

ANY EXPRESS WARRANTY NOT PROVIDED HEREIN AND ANY IMPLIED WARRANTY, GUARANTY OR REPRESENTATION AS TO PERFORMANCE, AND ANY REMEDY FOR BREACH OF CONTRACT TORT OR ANY OTHER LEGAL THEORY WHICH, BUT FOR THIS PROVISION, MIGHT ARISE BY IMPLICATION, OPERATION OF LAW, CUSTOM OF TRADE OR COURSE OF DEALING, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR PARTICULAR PURPOSE, WITH RESPECT TO ANY AND ALL EQUIPMENT FURNISHED BY MILLER IS EXCLUDED AND DISCLAIMED BY MILLER.

Some states in the U.S.A. do not allow limitations of how long an implied warranty lasts, or the exclusion of incidental, indirect, special or consequential damages, so the above limitation or exclusion may not apply to you. This warranty provides specific legal rights, and other rights may be available, but may vary from state to state.

In Canada, legislation in some provinces provides for certain additional warranties or remedies other than as stated herein, and to the extent that they may not be waived, the limitations and exclusions set out above may not apply. This Limited Warranty provides specific legal rights, and other rights may be available, but may vary from province to province.





# Owner's Record

Please complete and retain with your personal records.

| | |
|---|---|
| Model Name | Serial/Style Number |
| Purchase Date | (Date which equipment was delivered to original customer.) |
| Distributor | |
| Address | |
| City | |
| State | Zip |



# For Service

***Call 1-800-4-A-Miller or see our website at www.MillerWelds.com to locate a DISTRIBUTOR or SERVICE AGENCY near you.***

Always provide Model Name and Serial/Style Number.

| | |
|---|---|
| Contact your Distributor for: | Welding Supplies and Consumables<br>Options and Accessories<br>Personal Safety Equipment<br>Service and Repair<br>Replacement Parts<br>Training (Schools, Videos, Books)<br>Technical Manuals (Servicing Information and Parts)<br>Circuit Diagrams<br>Welding Process Handbooks |
| Contact the Delivering Carrier for:<br><br>For assistance in filing or settling claims, contact your distributor and/or equipment manufacturer's Transportation Department. | File a claim for loss or damage during shipment. |

**Miller Electric Mfg. Co.**
An Illinois Tool Works Company
1635 West Spencer Street
Appleton, WI 54914 USA

**International Headquarters–USA**
USA Phone: 920-735-4505 Auto-Attended
USA & Canada FAX: 920-735-4134
International FAX: 920-735-4125

**European Headquarters – United Kingdom**
Phone: 44 (0) 1204-593493
FAX: 44 (0) 1204-598066

www.MillerWelds.com




PRINTED IN USA